AGRICULTURAL *Chemicals*

In this issue

A Visit to Seabrook Farms

NAC Discusses Miller Bill

Material Handling at SSPCo

Malathion Formulations

NAC Grows with Industry

Urea-Biuret Mixtures

Trends in the Industry



OCTOBER, 1955

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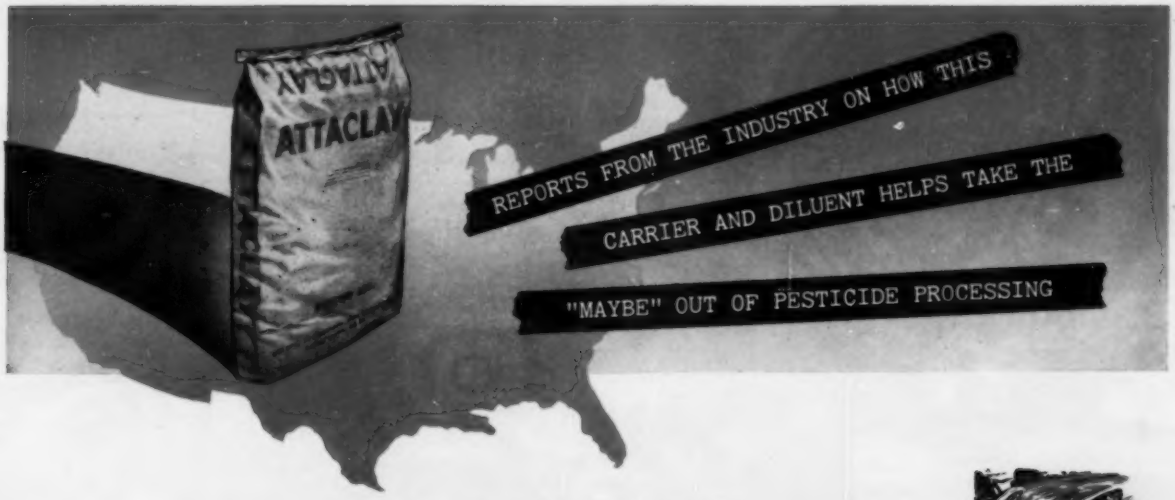
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AGRICULTURAL *Chemicals*



The National Agricultural Chemicals Association re-elected as its president, W.W. Allen (left) of Dow Chemical Company, Midland, Michigan; Lea Hitchner, executive secretary (center) and F. Hatch (right) of Shell Chemical Corporation, vice president, for 1956.

Vol. 10, No. 10 October, 1955

AGRICULTURAL *Chemicals*

ARTICLES

A VISIT TO SEABROOK FARMS 30
By Hamilton Carson

N.A.C.A. HOLDS 22nd ANNUAL MEETING 33

MATERIALS HANDLING AT SOUTHERN STATES PHOSPHATE CO. 40

MALATHION AND ITS FORMULATIONS (Part 2) 42
By J. F. Yost, J. B. Frederick and V. Migrdichian

MAJOR TRENDS IN THE PESTICIDE INDUSTRY 45
By Warren Moyer

N.A.C. GROWS WITH THE INDUSTRY 47
By Lea S. Hitchner

UREA-BIURET MIXTURES 49
By R. W. Starostka and K. G. Clark

FEATURES

EDITORIAL 29

THE LISTENING POST 53
By Kelvin Dorward and Paul Miller

WASHINGTON REPORT 56
By Donald Lareh

TECHNICAL SECTION 58

INDUSTRY NEWS 64

INDUSTRY MEETING CALENDAR 91

SUPPLIERS' BULLETINS 92

CLASSIFIED ADVERTISING 109

ADVERTISERS' INDEX 113

TALE ENDS 114

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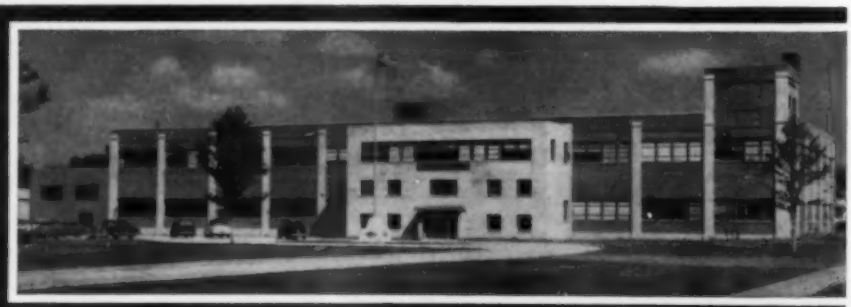
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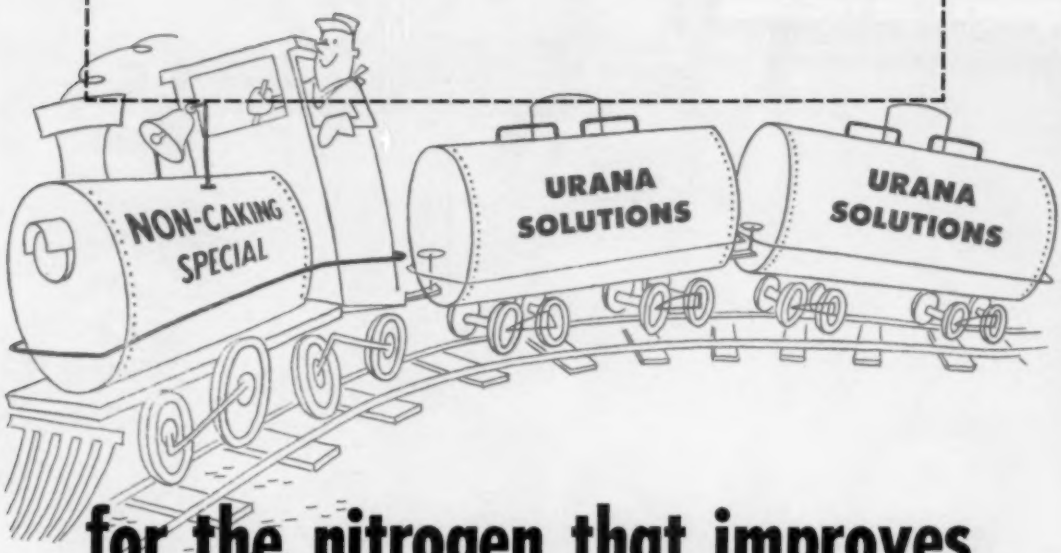
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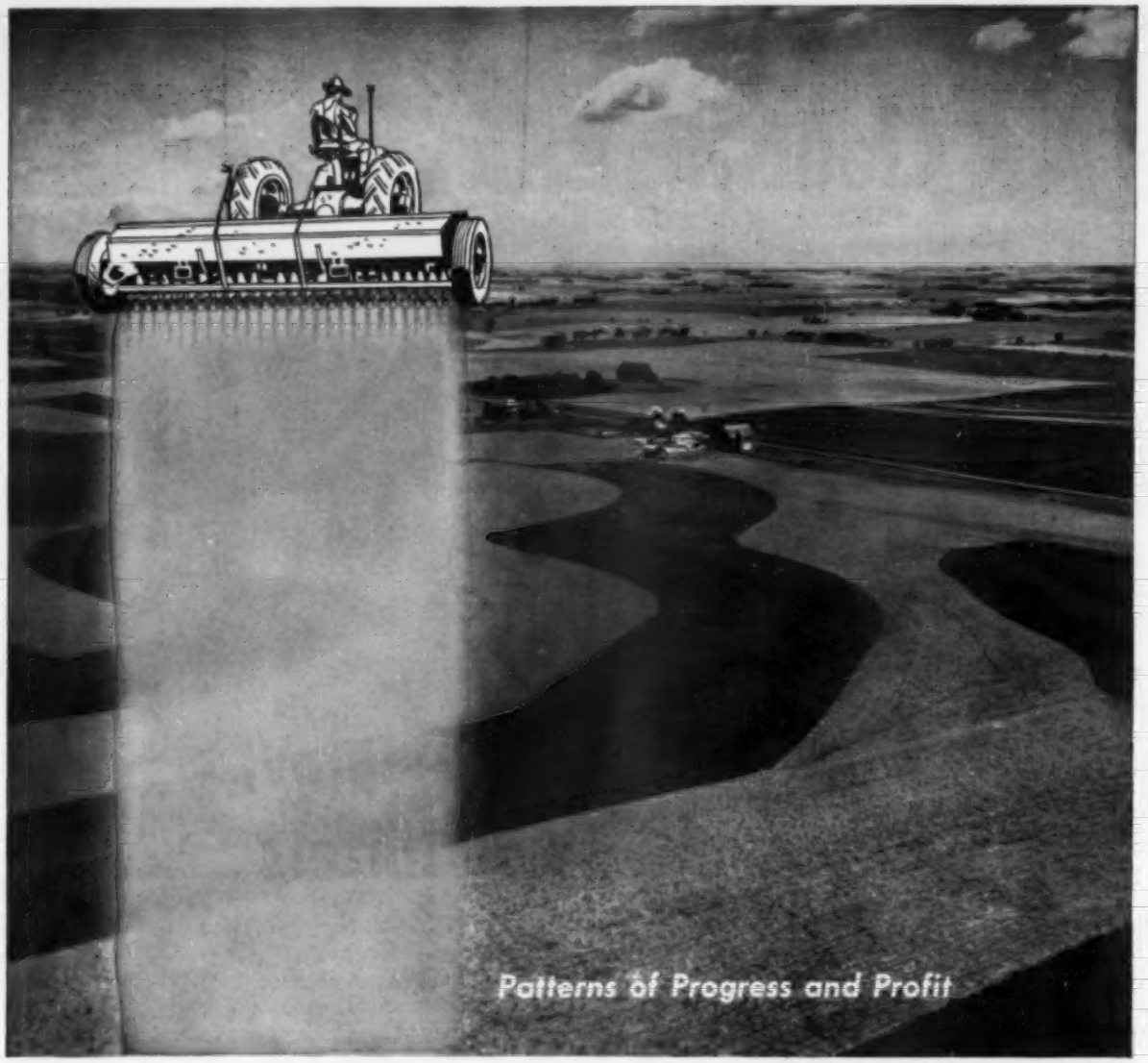
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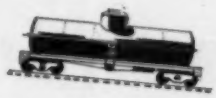
5 PHILLIPS Fertilizer Materials for High Analysis Mixtures

1 Ammonium Sulfate



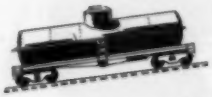
New Premium Quality Phillips *66* Ammonium Sulfate contains 21% nitrogen, 23.8% sulfur. It is *dry*-cured to remove excess moisture, prevent caking. Uniform dust-free crystals flow freely, mix easily. Ideal for all analyses of mixed goods and for direct application. Available in bags or bulk.

2 Anhydrous Ammonia



Phillips *66* Agricultural Ammonia contains 82% nitrogen. It's a convenient, economical source of nitrogen for formulation. Tank car shipments are assured to Phillips contract customers by Phillips huge production facilities in the Texas Panhandle and at Adams Terminal near Houston, Texas.

3 Nitrogen Solutions



Get more N per dollar! There are three Phillips *66* Nitrogen Solutions for use in preparation of high-analysis fertilizers and the ammoniation of superphosphate. These solutions keep handling costs low; help rapid, thorough curing.

4 Ammonium Nitrate



Phillips *66* Prilled Ammonium Nitrate contains 33.5% nitrogen. The small, coated prills or pellets resist caking, handle easily. Depend on Phillips *66* Prilled Ammonium Nitrate for uniform free-flowing properties in formulations and top-notch crop response as a direct application material.

5 Triple Superphosphate



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Phillips 66

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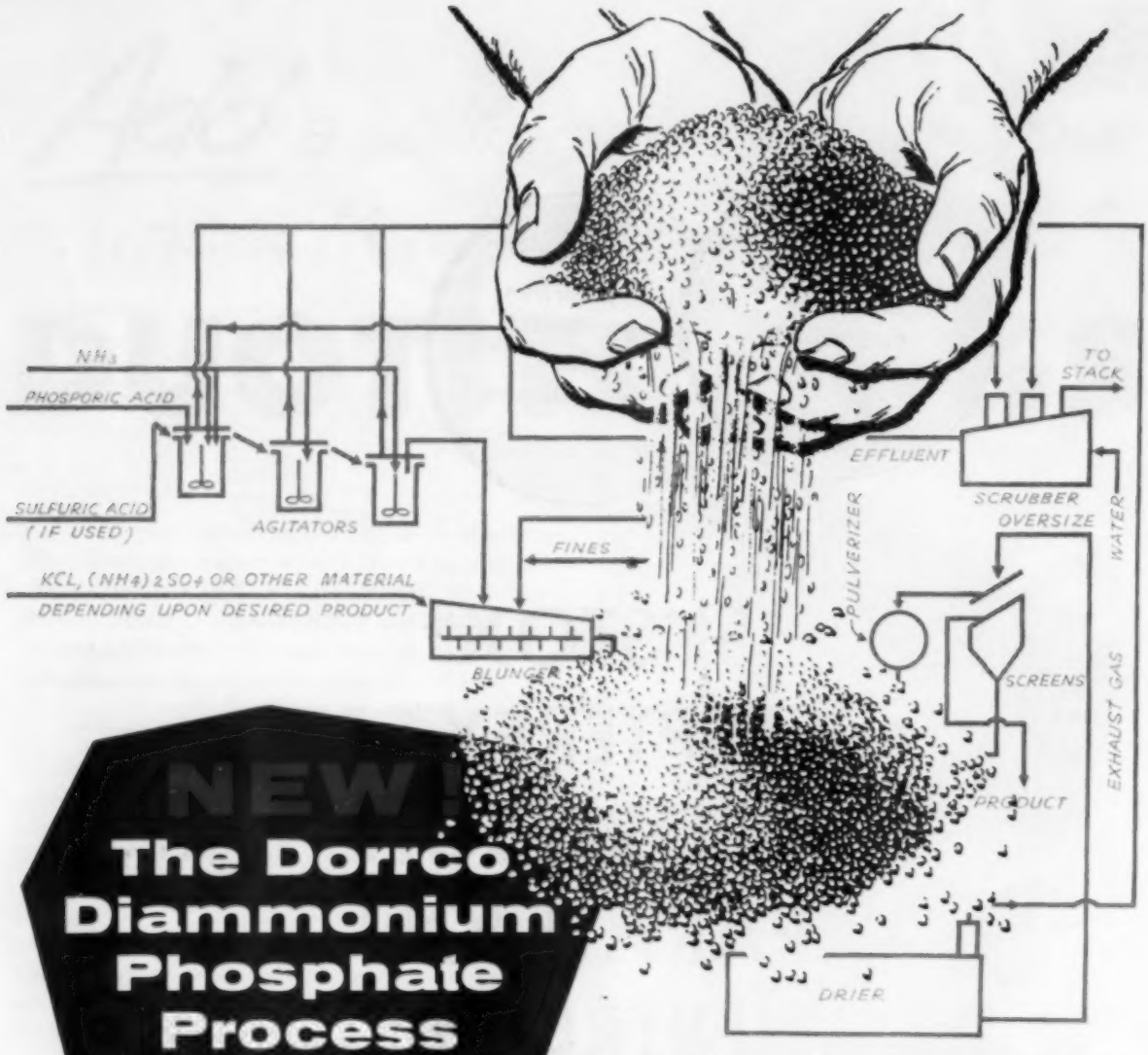
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of the Indian Jute Mills Association

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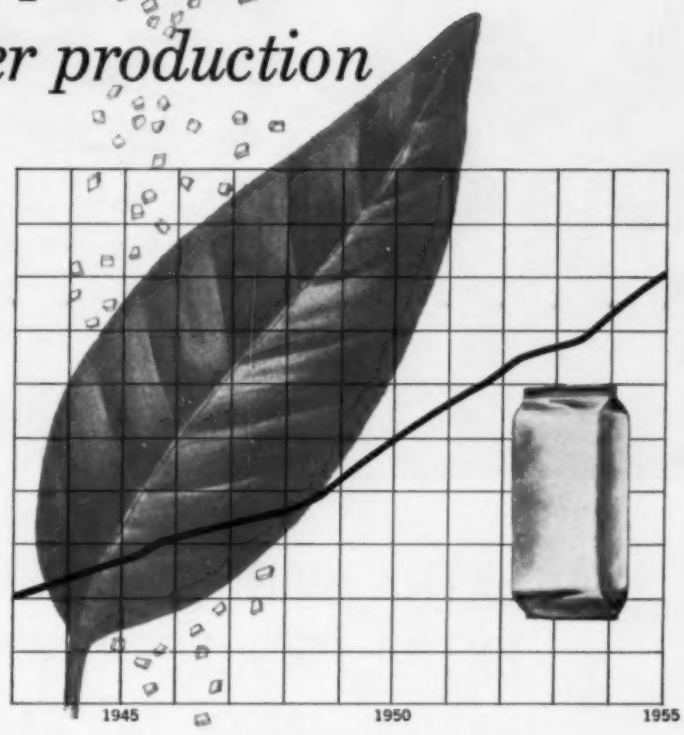
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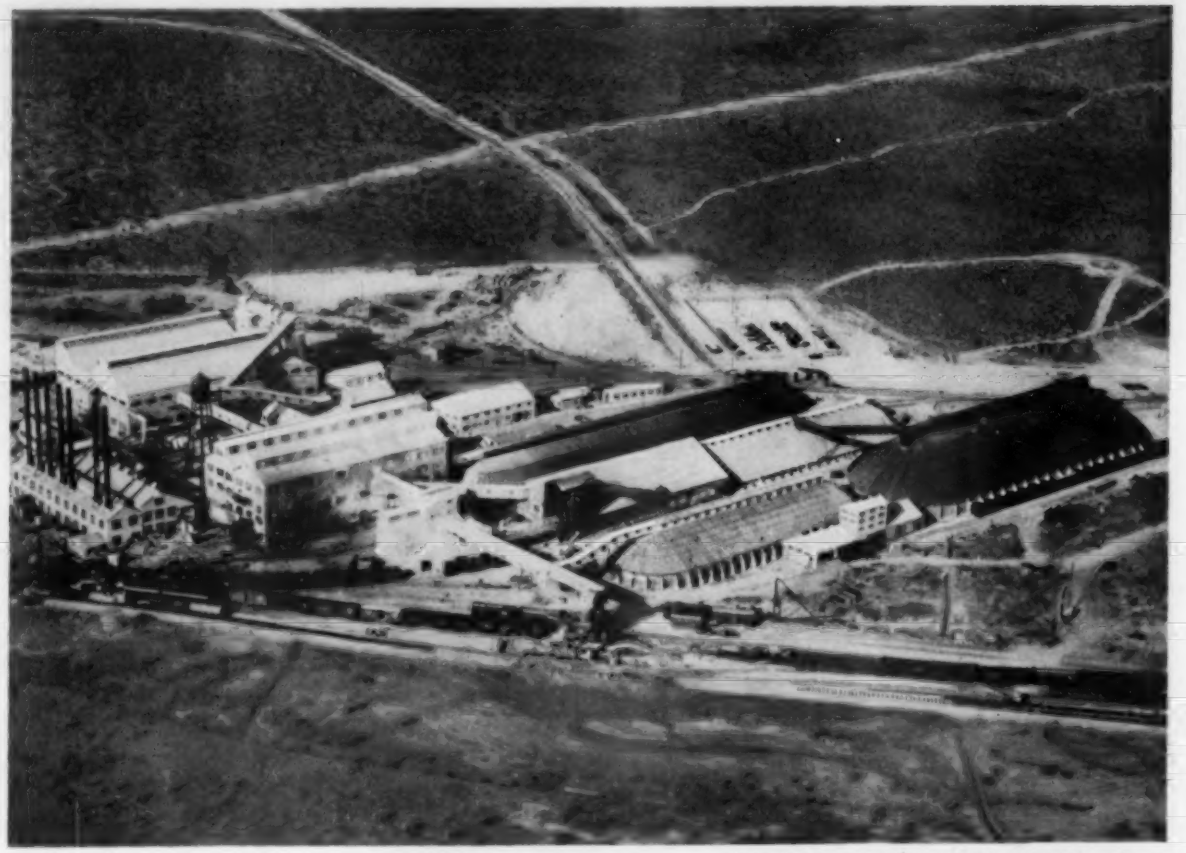
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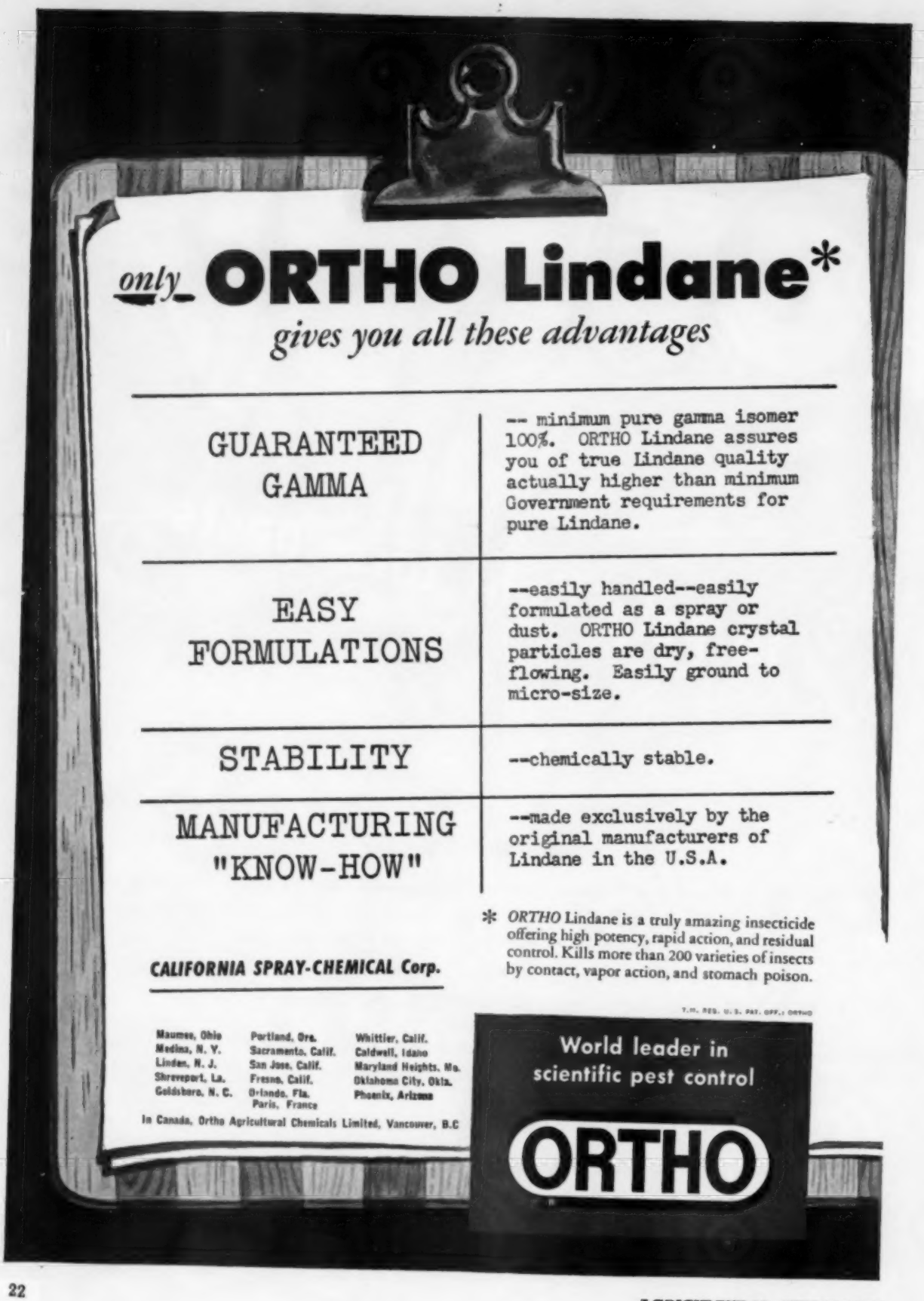
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Bleached Kraft	✓	
Creped Kraft	✓	
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Open Mouth Bags—sewn or pasted	✓	
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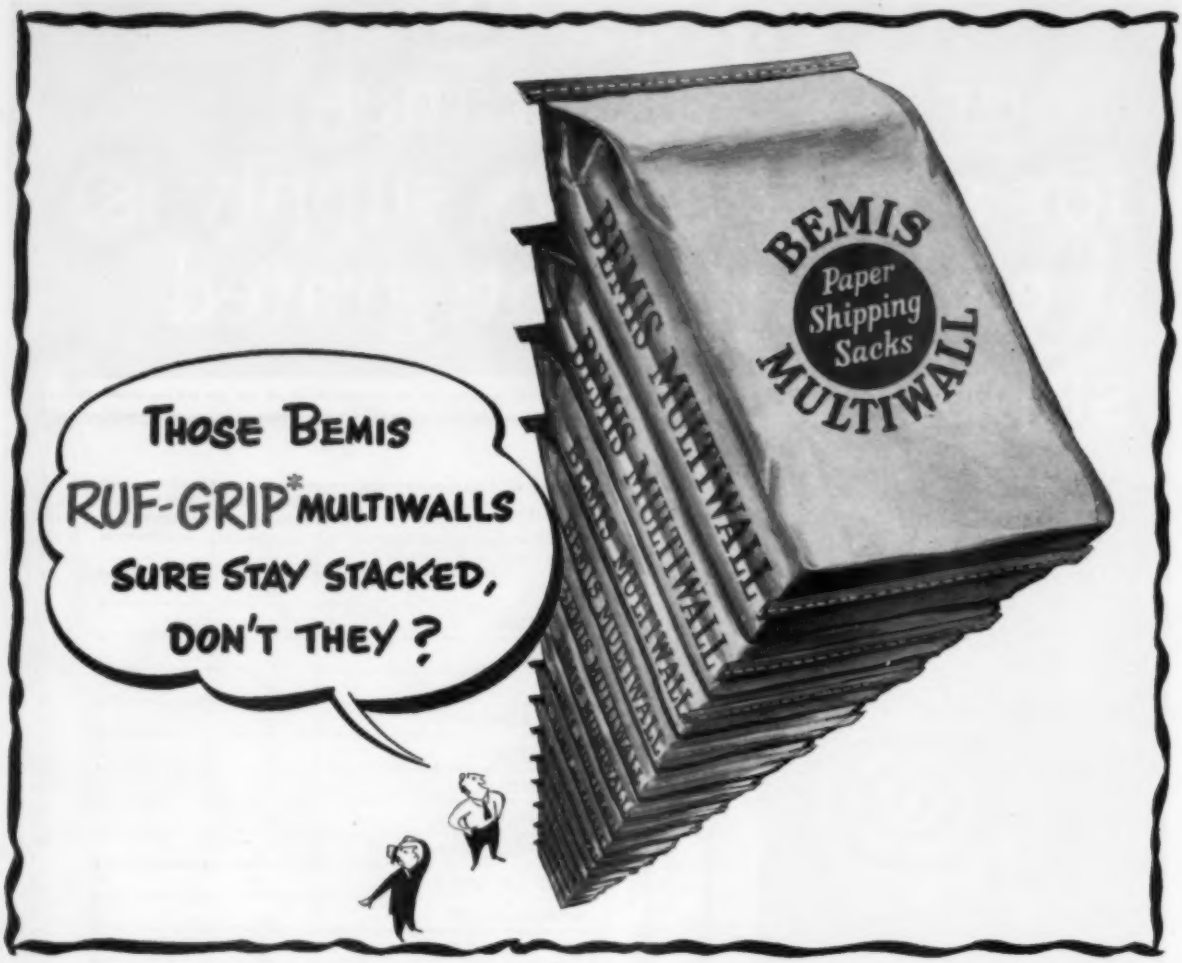


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to speed production . . .
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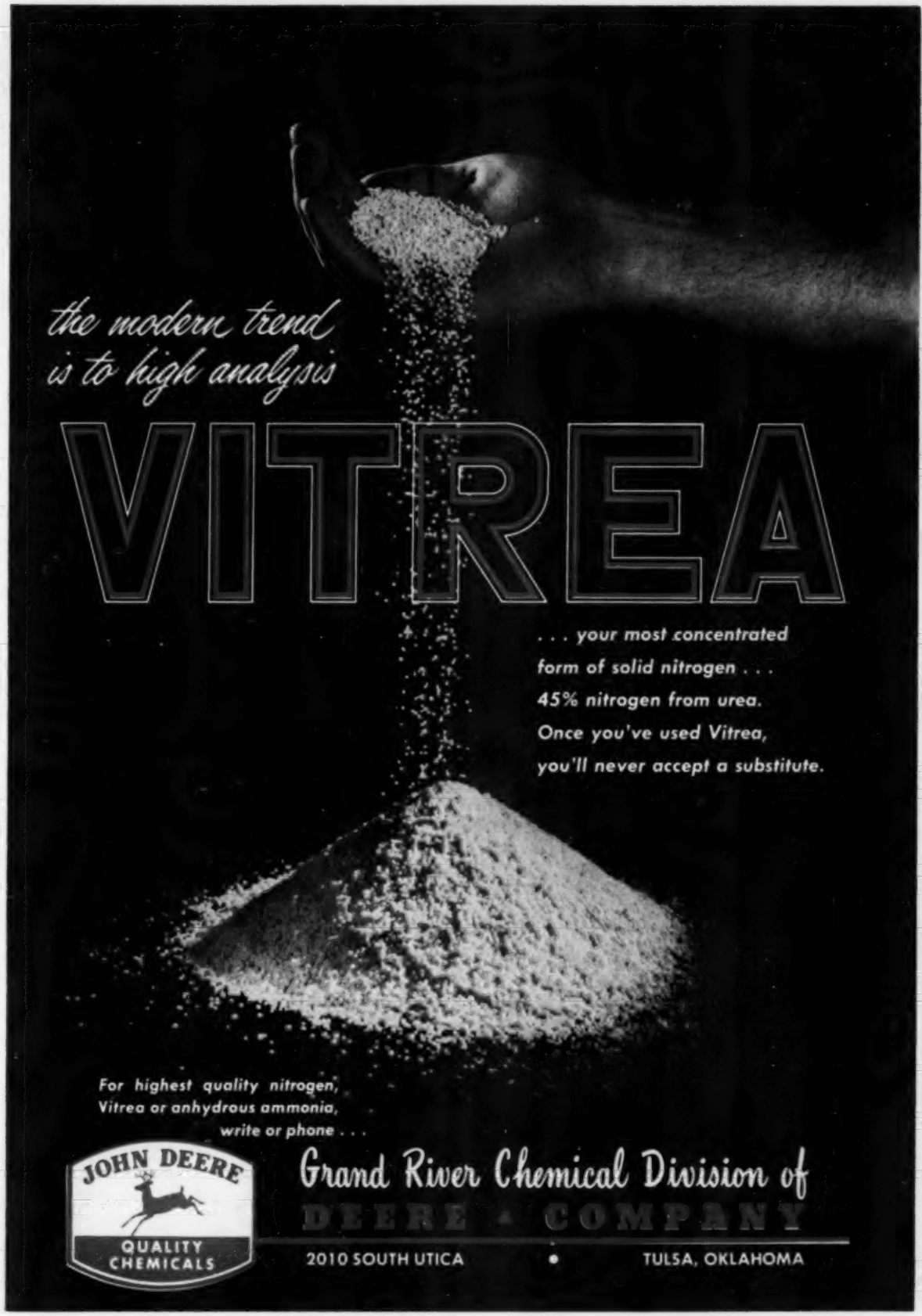


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"Agriculture's most useful form of nitrogen"

1. Farmers get MORE HUMUS, FASTER from cover crops and crop wastes by plowing them down with free-flowing Cyanamid.

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3. The 20% nitrogen in Cyanamid resists leaching . . . is available to crops from plow down until harvest, come drought or heavy rains. This "staying" quality of Cyanamid nitrogen permits plow down *at any time of year.*

4. Plow down with Cyanamid places nitrogen in the root zone where it can be used by the plants. It encourages deeper rooting, helps crops withstand drought.

5. Using Cyanamid AVOIDS the reduction in yield which often follows plow down of crop wastes and mature cover crops alone.

6. Production costs go down, because Cyanamid eliminates the expense of side- or top-dressing.

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Editorial
COMMENTS

WHATEVER happened to the "Buy Early" program, designed to persuade the farmer to share in the task of stock piling his own insecticide? It is clear to every old timer in the business that it is beyond the capacity of the industry's facilities to make and store in advance a sufficient volume of insecticide dusts and sprays to protect the farmer against peak conditions of infestation which may develop. And it is equally obvious that it is not possible to make and deliver the materials needed after the infestations develop,—more obvious than ever this season, when late infestations of big proportions found the industry unable to supply the demand, and the farmer in many cases unable to apply materials received late, because rank growth and wet weather made it impossible to get into the fields.

As a result, the farmer, in many cases, lost valuable crops, and the insecticide manufacturer lost a market for his product.

Perhaps with this recent lesson brought into sharp focus, the farmer may be more inclined to revert to a "Buy Early" program for '56. But, as we see it, the job of the insecticide industry is to keep hammering away season after season for acceptance of the "Buy Early" idea. You don't buy insurance just after an accident, —or start a fire department after a disastrous fire. Preparedness for insect attack must be accepted by the farmer as a necessary year-in-and-year-out condition . . . and he must be persuaded to accept the fact that he should share part of the responsibility for the essential stock piling of ammunition to meet the attack . . . if, and when, it develops.

REPORTS from the field this season point to a continuation of the trend toward increased use of fertilizer-pesticide mixtures. It is estimated that employment of such combination applications in 1955 has grown fifty to seventy-five per cent above previous levels, giving a rather clear indication that the farmer is sold on the convenience and economy of mixtures.

While it has been equally obvious that the fertilizer manufacturer would prefer to avoid the problems connected with fertilizer-pesticide combinations, this attitude now seems to be giving way to an acceptance of the fact that the mixtures are here to stay. The buyer is the boss, particularly now that it takes some selling to move fertilizer, and the farmer is no longer sending his own truck around to pick up wanted material direct from the bagger.

Problems in connection with registration, labeling, analysis, etc. of such mixtures will be prominent on the program of the coming meeting of the American Association of Fertilizer Control Officials, to be held in Washington later this month. If the use of such mixtures is to continue to expand, the legal mechanics of the situation need early attention by the government officials entrusted with the job of making and enforcing the rules.

How fertilizers, insecticides are used, and why, at

● SEABROOK FARMS

By Hamilton C. Carson

THE story of the Seabrook Farms frozen food operation has been dramatically told in magazine and newspaper feature articles in recent years. It is truly a dramatic setup, as *Agricultural Chemicals* noted on a visit this summer to the sprawling New Jersey farm located at Seabrook (it now rates a post office.)

This highly mechanized and neatly integrated operation is intriguing for several reasons. First, a visitor to the farm is impressed by the elaborate radio-phone setup connecting trucks and offices in various parts of the 19,000-acre farm. Then there is the fleet of biplanes spraying and dusting fields in neat swaths. Behind all this is cosmopolitan Seabrook Village, a thriving town with 1,000 families.

When you look beneath the surface, however, you find the most interesting part of the picture from the viewpoint of the agricultural chemicals industry. That's when you learn about such concepts as fertility levels, heat units, broadcast vs. side dressings of fertilizers, use of cover crops and a research program that would make the average farmer think he was at the state experiment station.

But before taking a closer look at those subjects, consider first these facts which show the magnitude of the Seabrook operation:

Facts and Figures

THE company packs 100,000,000 pounds of fruits and vegetables a season. The nearly 50,000 crop acres owned or contracted by Seabrook account for 15 percent of the country's entire output of frozen vegetables, processed right on the farm in the world's largest freezing plant, which covers 23 acres. During the peak season, 3500 persons are employed. Equipment includes 500 trucks, machines, trailers and five



Smoke Puffer . . .

Boeing biplanes. An average of 10,000,000 gallons of water are used daily in the peak season. Seed planted in a year totals 2,000,000 pounds; fertilizer totals 10,000 tons, most of it in bulk form.

Although the size of the Seabrook operation and the facilities, including the most modern equipment, are impressive, the company's techniques, including the chemicals used, have made a great contribution to agriculture. It might be considered a giant pilot plant which serves the agriculture of southern New Jersey and is now expanding over into Delaware.

Take Dr. Frank App, for instance. He has been director of research and development for many years. His chief concern is finding ways of increasing yields of vegetable crops by sound soil management and by utilizing to best advantage fertilizers and pesticides. He continually seeks vegetable varieties of higher production and better quality.

Chemicals Important

DR. App is a firm believer in the value of agricultural chemicals. And he will tell you right off that Seabrook's bill for fertilizers, insecticides and other chemicals for crops harvested mechanically is greater than that for labor.

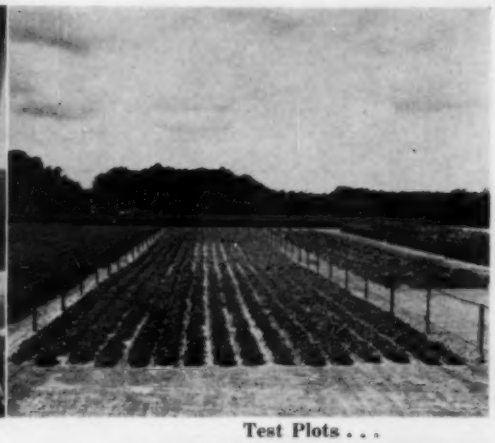
Dr. App, who has been in the forefront of agricultural research for many years, credits optimum application of fertilizers and proper selection and growing of cover crops with 40 percent increases in crop yields.

Since they began quick-freezing, Seabrook has pioneered many farm practices involving the use of chemicals for growing and protecting crops. As fast as these practices are developed on its own farms, tested and found desirable, they are recommended and used by their contract growers.

The Seabrook soil laboratory was established for the purpose of determining why a crop grown in adjoining fields with the same type of soil, receiving the same kind of fertilizer, the same variety of seed and planted the same day, resulted in the yields of one field being almost twice that of the other. Dr. App, and his associates, after taking thousands of soil



Soils Laboratory . . .



Test Plots . . .

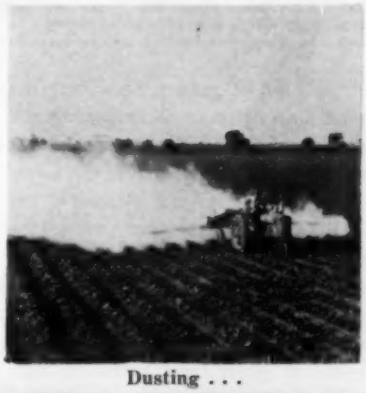
analyses and correlating these with the crop yields, found the differences usually were due to one or more of the plant nutrients being insufficient or low in availability. In other words, they discovered each crop had a standard of fertility necessary to furnish optimum conditions for growth.

These soil samples were taken in the fields where the crops are grown commercially. Later the experimental plots were established and the results checked. Again the same fertility requirements were found to be necessary. All of the essential elements, including some of the so-called minor elements were checked and from this information standards for available nutrients for each crop were established.

In this way, a soil analysis can be obtained and definite recommendations made on how much and what kind of each particular element should be applied with the fertilizer. Today Seabrook fertilizers all are formulated on company specifications. A soil test is made for each field and crop each year and it is fertilized in keeping with what the requirements indicate. Research from the laboratory also showed that organic matter was quite important along with the other plant nutrients. Seabrook always grew cover crops. After it established the value of organic matter through analysis from the laboratory, correlated with the crop yields, Seabrook began to fertilize the cover crops. Now the farm grows its cover crops in a manner very similar to that of the cash crops. Sufficient plant food is applied to produce the desired quantity and quality. This necessitates the fall application of fertilizer for the cover crops seeded early in the fall of the year. Those seeded late usually receive their fertilizer as soon as growth begins in the spring. The cash crop again receives an additional amount depending upon what



Fertilizing . . .



Dusting . . .

Aerial Dusting . . .



B.L., J.M., C.F. and C.C. Seabrook



How Seabrook Controls Pests

Crop	Pest	Control
Asparagus	Asparagus beetle, 12-spotted beetle	1% rotenone dust on cutting beds (by plane) 5% DDT on brush
Peas	pea aphid (which) carries pea mosaic)	1% Parathion (Wind Puffer described in article is used to make sure turbulence is below six m.p.h.)
Beans	Mexican bean beetle, 2-spotted mite	1% parathion, 25% sulfur. For snap beans, no toxic materials after pods start to set, 5% Methoxychlor, DDT before pods.
Lima Beans	bean looper, downy mildew	1% Parathion or 5% DDT for looper; 7% tribasic copper dust or standard Dithane spray for mildew (other research under way)
Broccoli	aphids	1% TEPP (also testing endrin and dieldrin)
Corn	army worms	5% DDT

Weed Control

Seabrook controls weeds as follows: Corn—Sinox PE, pre-emergence; beans—Sinox PE, pre-emergence; peas—Sinox PE, Sinox W, post-emergence; spinach—Chloro-IPC, pre-emergence; asparagus—CMU, after discing in spring.

crop is to be grown. However, the total amount of fertilizer used is not any greater and for some crops less than what was used before the cover crops were fertilized. Seabrook has established measures of value for good cover crops. The company finds a well grown cover crop is equivalent in terms of organic matter to approximately 10 tons of manure, and in terms of plant food a ton of high grade fertilizer. It also has established a better practice for using fertilizers, most of which are plowed under.

Much time has been given to, and many experiments have been conducted pertaining to the farm practice of fertilizer placement. The research and commercial results at Seabrook Farms show soil standards should be the guide instead of fertilizer placement. In order to obtain the necessary fertility standards, fertilizers must be broadcast and in most cases plowed under. Much of the side-dressing once practiced at Seabrook has been discontinued. Fertility levels for each crop have been established. The soil analysis shows how much of the various plant nutrients must be added to both the cover and cash crop. When these standards are achieved, fertilizer placement is an obsolete issue.

The yields at Seabrook have greatly increased. Yields do not drop so low under unfavorable weather conditions as they did before these standards were established. This lent stability to the industry as well as to quality of the product desired by the processing plant for quick-freezing. Side-dressing has been eliminated for all the spring crops. Two of the fall crops, spinach and broccoli, occasionally receive additional nitrogen provided the soil test shows the nitrogen level is low. Peas, which once were considered a crop not adapted for South Jersey, have yielded for the past five years an average of approximately 2800 lbs. per acre.

Spinach, which used to produce an average of less than five tons per acre is now producing well over that amount. Furthermore under the old farm practice, a pound of plant food produced 93 lbs. of spinach whereas today it is producing 218 lbs. This is not only an increased quantity for plant food applied but also an increase per acre and of higher quality.

When the laboratory was started in 1941, the Cooperative G.L.F. requested the privilege of participating for the purpose of determining whether fertilizers it sold its patrons were the proper ones to grow their crops for which they were sold. Seabrook buys fertilizers from two sources, the G.L.F., and the Star Fish and Bone Co., of Bridgeton.

Research does not stop with the chemicals used for feeding the crops. The selection and use of a large number of chemicals is necessary for the control of insects, diseases, and weeds. After these chemicals are cleared by research, their use is administered by Louis J. Abrams, who is in direct contact with the various division managers. The chemicals are applied by airplane as well as by ground equipment including dusts and wet sprays. For some crops, herbicides are applied from equipment attached to the planters. This is particularly true of corn and beans. Inasmuch as the chemical industry is producing new materials every year, a continual program of research must be carried on to determine whether any of these new materials are superior to current products.

To aid in scheduling dusting by airplane, Mr. Abrams several years ago developed a unique wind measuring device in cooperation with Maurie Halstead, then of the Johns Hopkins staff. Called a "smoke puffer," it is composed of a Model T coil and spark plug, a battery and a small amount of black powder. The spark ignites the powder in a small cup to start the test. If the smoke remains visible for at least 33 seconds, indicating little turbulence, Mr. Abrams gives the go ahead to the dusters.

Shortly after Seabrook began its

(*Continued on Page* 101)



Above: The board of directors of the National Agricultural Chemicals Association. (Identification of members on page 35)

National Agricultural Chemicals Association

DISCUSSES MILLER AMENDMENT; INDUSTRY'S ROLE IN RESEARCH; TRENDS IN INDUSTRY...AT 22nd ANNUAL MEET IN SPRING LAKE, N. J.

AN open discussion on how the Miller Amendment may be interpreted and enforced . . . how tolerances are to be defined and determined . . . and what may be expected under operation of the new bill . . . gave NAC members an opportunity to clarify any questions they may have concerning the Miller Law at the 22nd annual meeting of the National Agricultural Chemicals Association, held September 7-9th at the Essex and Sussex Hotel, Spring Lake, N. J.

Some 600 members and guests attended the three-day conference, to review the role of research in industry; to discuss safety in the manufacture and use of agricultural chemicals; and to consider major trends in the pesticide industry. Various services of the NACA were outlined by executive secretary, Lea S. Hitchner, reminding members of the availability of programs and data which are of direct interest to management and technical executives.

The Association reelected W. W. Allen, Dow Chemical Co., Midland, Mich., as president for 1956, and Fred Hatch, Shell Chemical Corp., New York, as vice president. Lea S. Hitchner continues as executive secretary.

Three new members were elected to the Board of Directors: James D. Hopkins, Hopkins Agricultural Chemical Co., Madison, Wisc.; William J. Liipfert, Woolfolk Chemical Works, Ltd., Fort Valley, Ga.; and Loren P. Scoville, Diamond Alkali Co., Cleveland. Elected for five-year terms, they will take positions on the board vacated by retiring members, A. W. Mohr, California Spray Chemical Co., Richmond, Va.; Russel B. Stoddard, Fairfield Chemical Division, Food Machinery & Chemical Corp., New York; and T. L. Wilkerson, American Cyanamid Co., New York.











Growth and Future of the Pesticide Industry

A BLUNT account of the growth of the agricultural chemicals industry, its problems and future was outlined in an address to NAC members by Warren Moyer, Chipman Chemical Co., Bound Brook, N. J., who emphasized the point that the management function . . . as it applies to the pesticide industry . . . must be further developed for a successful future of the industry. He indicated that in his opinion, two of the most important factors affecting the industry are: "the introduction of a great many new companies, particularly some very large chemical manufacturers, while on the other hand, the nature of the products involved, and their formulation and methods of use have resulted in development of a great many small companies, mixing and formulating basic chemicals produced by others.

"Certainly," he said, "no one can deny the essentiality of the large chemical manufacturer with basic chemical production facilities and large technical staff; at the same time, I don't believe anyone can properly deny the place of the small mixer and formulator who serves at a local level. It is inevitable that with so many new factors involved, time will be required for the proper integration of these various activities to their most efficient functions and relationships."

In a discussion of the supply-demand picture, Mr. Moyer reviewed the necessity for maintaining reserve inventories . . . and continued to say that "Demand is created not only by demonstration that a product will perform its function, . . . but beyond that, demand is controlled by the question of whether or not the function is necessary at the moment."

He suggested that performance of an efficient service for the customer is the only just claim to supplying this demand. He said that "If we keep our eye in the direction of the development of business, based on service and efficiency, we will not have to seek the channel of endeavor which consists of simply trying to steal business which has been developed by others."

Elaborating on the necessity for developing better management, Mr. Moyer appealed to his listeners for "good research, honest technical service, a sound sales policy and realis-

Editors Note: The full text of Mr. Moyers talk appears on pages 45-47.

In The Camera's Eye

(1) R. Peacock, General Reduction Co., Chicago; J. Taylor, Taylor Chemical Co.; A. Mohr., California Spray Chemical Co., Richmond.
(2) J. J. Lawler, Shell Chemical Corp., New York; J. H. Kennedy, Stauffer Chemical Co., New York; and M. M. Lowish, Shell Chemical Corp.
(3) R. W. Breidenbach, Commercial Solvents Corp., New York; E. W. Cannon, California Spray Chemical Corp., Richmond, Calif.; J. F. Staugh, Davison Chemical Co., Charleston, S. C.
(4) William J. Gehweiller, William K. Feustel, both of R. T. Vanderbilt Co., New York; and C. G. Whinfrey, Pennsalt Mfg. Co. of Washington.
(5) J. B. Maddrey, Planters Chemical Co., Norfolk, Va.; S. Epstein, T. Riedeburg, and A. Raven, all of Emulsol Chemical Corp.
(6) M. J. Bunnell, Geigy Agricultural Chemicals, New York; J. P. Wilcox, Charles Pfizer & Co., Brooklyn; Mrs. and Mr. Bruce Gleissner, Diamond Alkali Co., Cleveland; and (seated) E. H. Phillips, G. L. F. Soil Bulding Service, New York.
(7) (Seated): J. Smillie, Wm. Cooper & Nephews, Chicago; W. E. O. Walker Leigh, Cooper McDougall & Robertson, Ltd., Berkhamsted, England; (Standing): E. Dobbin, Edco Corp., Elkton, Md.; L. C. Baptistella, Benzenex, Sao Paulo, Brazil; P. Wittlinger, Wm. Cooper & Nephews, Chicago.
(8) (seated) T. W. Brasfield, Naugatuck Chemical Co., Naugatuck, Conn.; S. Besthoff, Faesy & Besthoff, Inc., New York; (standing) P. J. Reno and Paul Mayfield, Hercules Powder Co.
(9) Fred Hatch, Shell Chemical Corp., New York; G. Hill, Jr., Chemagro Corp., New York; (seated): L. S. Kaniecki, Tennessee Corp., Atlanta, Ga. and Rosmarie vonRumker, Chemagro Corp., New York.
(10) G. D. Baerman, and Dr. and Mrs. A. Weed, Olin Mathieson Chemical Corp.

NAC Board Members

(Picture on page 33) Standing, l to r: J. D. Hopkins, Hopkins Agricultural Chemical Co., Madison, Wisc.; W. J. Liipfert, Woolfolk Chemical Works, Fort Valley, Ga.; E. Phillips, GLF Soil Building Service, New York; G. C. Romig, American Chemical Paint Co., Ambler, Pa.; T. L. Wilkerson, American Cyanamid Co., New York; L. P. Scoville, Diamond Alkali Co., Cleveland; R. Stoddard, Fairfield Chemical Division, Food Machinery & Chemical Corp., New York; A. W. Mohr, California Spray Chemical Corp., Richmond, Calif.; C. H. Sommers, Jr., Monsanto Chemical Co., St. Louis and G. Leonard, Shell Chemical Co., Washington, D. C. (seated) C. M. Brown, Allied Chemical & Dye Corp., New York; A. Petrus, Cotton States Chemical Co., W. Monroe, La.; J. Kennedy, Stauffer Chemical Co., New York; P. Mayfield, Hercules Powder Co., Wilmington, Del.; (president) W. W. Allen, Dow Chemical Co., Midland, Mich.; (vice president) F. Hatch, Shell Chemical Corp.; New York, and Lea S. Hitchner (NAC executive secretary).

tic merchandising and general management policies. There is room," he said" for big companies and small ones, national companies and local ones, if they will wisely fit themselves into the picture and perform their functions efficiently without attempting to overreach and infringe upon activities they are not suited to perform."

Problems in the Boom

A DIFFERENT approach to the analysis of the chemical market was presented by H. E. Luedicke, *Journal of Commerce*, New York . . . who warned that the current boom in business involves two major vulnerabilities. "The first," he said, "is the rapid rise in private indebtedness that has spurred the 1955 recovery far beyond the expectations of even the greatest optimists. The other, actually far more insidious than the role played by debt expansion, is not getting nearly the attention it warrants. That is the progressive cost squeeze against small business enterprises that goes on in the face of the greatest boom in our economic history and, in the end, may seal its doom."

Mr. Luedicke suggested that "One of the main features of the current boom is the fact that while most large corporations are showing record profits, smaller businesses are being progressively squeezed between rising costs and increased competition, which makes it extremely difficult in most lines to raise finished goods prices—despite the high level of consumer spending."

Mr. Luedicke summarized the relationship between private indebtedness, a restrictive credit policy, and profit squeezes . . . and also discussed several possible solutions which might help to normalize the economic picture. "A partial approach to the problem," he said, "lies in the application of sensible pricing policies." He suggested, too, that co-operative market analysis among smaller businesses in a particular field offers some possibilities for getting away from the "feast or famine" patterns.

Industry Statistics Needed

AN optimistic outlook on the future of the pesticide industry was voiced by W. W. Allen, Dow Chemical Co., Midland, Mich., who reminded his listeners that the next 20 years would see an increase in population of some 60 million people, and that it would require 100 per cent more chemicals to produce the 40 per cent increase in food necessary for the higher population. "The use of agricultural chemicals has climbed at a spectacular rate in the last five years," reported Mr. Allen, "and with sound public education, it should follow—within reason—the growth of population and consumer demand in the food field and in other lines."

Mr. Allen emphasized the need for an intense public educational program. "People just naturally fear the unknown," he said, and appealed to NAC members for closer cooperation with the Association in its public relations program. "Public education is costly, but education carries a bargain price compared to the costs of lawsuits, adverse legislation, and the general frustration and lost motion of spending most of our time defending ourselves. Being on the defensive is especially annoying," he observed,













Top Left: C. E. Griffith, and Ira Vandewater, Montrose Chemical Co.; Newark, N. J.; C. Siddall, Pennsalt Manufacturing Co. of Wash.; and Jack W. Moore, Floridin Co., Tallahassee.

Bottom Left (Seated) R. Lindenburg, Penn. Salt Mfg. Co. of Wash.; D. F. Murphy, Rohm & Haas Co., Philadelphia; (Standing) M. D. Reichard, Stauffer Chemical Corp., N. Y.; A. Carter, Sherwin Williams Co. of Canada; and D. Bennett, Phelps Dodge Refining Co, N. Y.

Top Right: T. Foster, Dow Chemical Co., Midland, Mich.; T. L. Bendall, Dow Chemical Co., New York; J. Polite, Diamond Alkali Co., Cleveland; Mr. Carter and, L. T. Kett, Mountain Copper Co., Ltd., San Francisco.

Bottom Right: Mr. and Mrs. V. Rebak, Grace Chemical Co., New York; R. W. Wert, Minerals and Chemical Corp. of America, Philadelphia; and (seated) Mrs. Wert.

"when you and I believe in our hearts that we are doing a good job in the judicious sale and manufacture of our materials . . . and we certainly are."

Mr. Allen commended the role of NACA in working with governmental agencies, the press, etc., in helping create an important new interest in the pesticide market, and in getting information to the public on local disease problems.

In the further interest of each member of the industry, Mr. Allen discussed the question of the extent of the pesticide market, and what can be done to make it more profitable.

He indicated that "We as an Association need some vital information ourselves. We need statistics about our markets, and we need them now. We are a big and complex industry, and our markets are often very new. When we forecast without enough data, and when we live in secrecy, we invariably overestimate the size of the market. And usually we underestimate the manufacturing and selling costs because we overestimate the market. That means overproduction and low profit margins . . . if any profit at all. The simple solution is to supply the Association with a wealth of collective information on potential markets, and share it.

"Specifically," he said, "we need over-all figures of production capacity; we need periodical production and sales figures; and we need reports of inventories.

"Nobody likes to reveal these figures . . . but let's get realistic . . . nobody likes enough insecticide in their warehouse to spray the seven planets in our solar system after the world market is saturated."

Mr. Allen suggested that the Association might act as a medium through which such data could be directed to a neutral and confidential agency which would collect the figures and compile an overall market analysis for the industry. "That's the kind of an Association I would like to see in the future," said Mr. Allen. "Useful information for each other, better public relations on the offensive, and committees that work as well as some have in recent months."

Miller Panel Highlight of Meeting

A STRONG interest in the Miller Amendment was obvious as members of the NAC took advantage of the opportunity to ask questions of the "experts." Lea S. Hitchner acted as moderator of the Miller panel which consisted of W. B. Rankin, Food and Drug Administration; Charles Palm, Cornell University; John Conner, NAC counsel; and J. T. Coyne, who represented W. G. Reed of the Plant Pest Control Branch, USDA.

W. B. Rankin advised NAC members that fees thus far collected in operation and enforcement of the Miller Bill have fallen far short of the expenses involved. He indicated that the committee "now has a better

basis on which to estimate income and expenses than in 1954, when the fee regulations were first proposed . . . Past experience indicates," he said, "that it will cost approximately twice as much to process these petitions as will be collected on the present fee schedule." Mr. Rankin advised that fees will, therefore, be increased, and that revised regulations have already been submitted to the Commissioner.

One of the questions prominent in the minds of industry representatives, was the status of defoliants under the Miller Law. Mr. Rankin clarified this point by explaining that "The Miller Bill defines a pesticide chemical as a substance which is an economic poison within the meaning of the Federal Insecticide Fungicide, and Rodenticide Act. Defoliants are not economic poisons within the meaning of this Act. Consequently, they are not pesticide chemicals and tolerances may not be established for them under the Miller Bill. However, foods which contain residues of defoliants are subject to the Federal Food, Drug, and Cosmetic Act. If defoliant residues are necessary in food, tolerances should be established for them under the public hearing procedures which were followed in the 1950 spray residue hearings."

"Some people believe," he said, "that it is futile to try to get a tolerance established under this public hearing procedure. This is not true. The belief probably stems from the delays which occurred after the 1950 hearing. In 1950 we tried to handle too many chemicals at one time. This resulted in a tremendous hearing record which could not be handled promptly. In 1950 approximately 80 chemicals were considered during the 82 days of spray residue hearings. This is an average of about one day per chemical and many chemicals required less time. If a hearing is confined to one or two related chemicals, we believe it can be held expeditiously, and proposed and final orders can be prepared promptly.

"In the future, we plan to limit the scope of public hearings on poisonous chemicals to avoid the development of an unwieldly hearing record. We believe that it is possible and practical to hold a public hearing on a defoliant or a group of defoliants in a matter of days and issue a final order based on that hearing within essentially the same period of time that is required now to process a petition under the provisions of the Miller Bill.

"If you manufacture a defoliant, or a fruit-set hormone, or similar compounds which are not subject to the Miller Bill, and you need a tolerance for their residues, we suggest that you file an appropriate request with the Commissioner of Food and Drugs for a public hearing."

Top Left: R. Ackerly, Sellers & Conner, Washington, D. C.; H. Grady California Spray Chemical Corp., Washington, D. C.; Mrs. Conner, John D. Conner, Sellers and Conner, Washington D. C.; and James D. Hopkins, Hopkins Agricultural Chemical Co., Madison, Wisc.

Bottom Left: R. W. Roth, Velsicol Corp., Chicago, Paul Truitt, National Plant Food Institute, Washington, D. C., Mrs. Truitt and W. Moreland, NACA, Washington, D. C.

Top Right: H. Howard, Thompson Hayward Chemical Co., Kansas City, Mo.; Dr. H. L. Haller, Agricultural Research Service, Washington, D. C.; R. S. Thompson, Thompson-Hayward Chemical Co., Kansas City, Mo.; and J. E. Bussart, Velsicol Corp., Chicago.

Bottom Right: (Standing) S. H. Bear, Food Machinery & Chemical Corp., Middleport, N. Y.; C. Siddall, Pennsalt Manufacturing Co. of Washington, Bryan, Texas; (seated) R. H. F. Dade, Food Machinery & Chemical Corp., Middleport; and A. Bixby, Pennsalt Manufacturing Co.















Pesticide Regulation Section

J. T. Coyne, reporting for the Plant Pest Control Branch, explained that the Pesticide Regulation Section has two functions under the Miller Amendment:

"1. The certification to the Food and Drug Administrtaion that the chemical is useful for the purpose for which a tolerance or exemption is sought.

2. The expression of an opinion as to whether the tolerance or exemption proposed by the petitioner reasonably reflects the residue likely to result from the proposed use.

"With respect to the certification of usefulness, we haven't had much difficulty, for most of the uses proposed in petitions submitted to date have been those for which some formulation of the particular chemical involved previously had been registered under the Federal Insecticide, Fungicide, and Rodenticide Act. This means that the effectiveness of the chemical had been determined at the time of registration. In some cases the uses of the chemical have been extended beyond those previously registered but on the basis of use experience, the data submitted, and other information which we were able to gather, we have been able, with a few exceptions, to certify the new uses.

However, we have received several petitions requesting certification for non-economic poison uses. We have been unable to comply with these requests because of statutory limitations. While it is true that the Miller Amendment basically encompasses the use of chemicals on food and feed crops, the statute explicitly defines a pesticide chemical as any substance which alone, in chemical combination, or in formulation with one or more other substances is an economic poison within the meaning of the Federal Insecticide, Fungicide, and Rodenticide Act. Therefore, we are unable to certify under Public Law 518 as to the usefulness of those chemical uses which have not been interpreted as economic poisons within the scope of the Federal Insecticide, Fungicide, and Rodenticide Act.

"The road hasn't been quite as smooth in carrying out our second responsibility, the opinion which we must submit to the Food and Drug Administration as to whether the tolerance or exemption proposed by the petitioner reasonably reflects the amount of residue likely to result from the proposed use. A recurring problem has arisen from the fact that in many cases the residue data submitted with respect to a particular use has been inadequate to serve as a basis for a fair opinion. In some cases there has been no data whatsoever with respect to a particular crop. If the petition shows residue results on another crop in the same family, we have been able in many cases to transfer the application of such data to the crop for which there were no residue results, and thus obtain a basis for our opinion. At other times, this problem of transferability has involved crops of such widely diverse characteristics and growing conditions that the transfer application of residue data was impossible. In these instances, we have had to notify the Food and Drug Administration that the data was inadequate to substantiate an opinion with respect to the residue likely to result on the paricular crop.

"Another problem that frequently has confronted us is the necessity for extrapolation of data. This results from the fact that in some peti-

(1) W. J. Murphy, American Potash and Chemical Corp., New York; E. H. Phillips, G. L. F. Soil Building Service, New York; and E. N. Shelton, Tennessee Corp., Atlanta, Ga.
(2) Mr. and Mrs. J. Rodda, Fairfield Chemical Div., Food Machinery & Chemical Corp., New York; Mr. and Mrs. E. K. Plant, Columbia Southern Chemical Corp., Pittsburgh.
(3) Jack Miller, Atlas Powder Co., Wilmington; W. B. Andrews, W. R. E. Andrews Sales, Inc., Philadelphia; and Newt Hall, Pioneer Chemical Associates, Denver, Colo.
(4) P. Rothberg, Montrose Chemical Co., and Carlos Kampmeier, Rohm and Haas Co., Philadelphia.
(5) G. Purvis, Standard Agricultural Chemicals, Inc., Hoboken, N. J.; John Kirk, Velsicol Chemical Corp., Chicago, and M. E. Williams, Dawson Cotton Oil Co., Dawson, Ga.
(6) G. E. Bruington and E. L. Thomas, Swift & Co., Chicago, and Lyle O. Hill, Reasor-Hill Corp., Jacksonville, Ark.

tions submitted the directions for use and the residue work have not been consistent with respect to the amounts of the chemical to be used, and the intervals between last application and harvest. For example, the directions may recommend the use of a pound of a given chemical per acre with a fourteen-day interval between last application and harvest. The residue data is based on the use of six to eight ounces of the chemical and intervals ranging from twenty one to forty days. Extensive projection of results has been necessary to even approximate what the resulting residues might be, and it often has been difficult to render a sound opinion.

"The last problem, to be mentioned, arises from a propensity on the part of some petitioners to propose tolerances on the basis of comparative toxicology irrespective of differences in dosage, application schedules, and the characteristics of the particular crops on which the pesticide chemical is to be used. On the basis of tolerances previously announced for other chemicals, petitioners have ascertained that the chemical for which they are petitioning is of the same order of toxicity, so the same tolerance should apply. This position has been maintained even though the residue data does not support the requested tolerance, and makes it difficult for the Department to render an affirmative opinion.

"We realize that all of us affected by this statute have been going through a readjustment period, and must frequently function on something less than optimum basis as we endeavor to carry out provisions of Public Law 518. The foregoing problems are cited in the hope that they will be of value to those folks who will be submitting petitions in the future. If situations of the nature mentioned can be remedied we can process petitions more expeditiously and satisfactorily for the petitioners."



Top Left: M. E. Clark, Frontier Chemical Co., Wichita, Kans.; A. Petrus, Cotton States Chemical Co., W. Monroe, La.; K.B. Nash, Olin Mathieson Chemical Corp., Baltimore; and W. Yoder, American Cyanamid Co., New York.

Top Right: Jack Dreessen, NAC herbicide specialist; Lee H. Grobe, and Ruth Wesley, NAC Association.

Center Left: R. W. Breidenbach, Commercial Solvents Corp., New York; E. W. Cannon, California Spray Chemical Co., Richmond, Calif.; and J. F. Stough, Davison Chemical Co., Charleston, S. C.

Center Right: Grub Leonard, Shell Chemical Corp., Washington, D. C.; R. Peacock, General Reduction Co., Chicago; D. Bennett, Phelps Dodge Refining Corp., New York; W. W. Allen, Dow Chemical Co., Midland, Mich.; K. K. Krausche, Floridin Co., Tallahassee, Fla.; and J. T. Conner, Jr., Taylor Chemical Co., Aberdeen, N. C.

Bottom Left: Miller Bill Panel: John Conner, NAC counsel; Lea Hitchner, NAC executive secretary; W. B. Rankin, USDA, Food and Drug Administration; J. T. Coyne, Plant Pest Control Branch, USDA; and Charles Palm, Cornell Univ.

Bottom Right: A. Petrus, Cotton States Chemical Co.; and J. Kennedy, Stauffer Chemical Co.

Extension, Growers' Viewpoint

THE position of extension men in making recommendations, pending the establishment of tolerances was outlined by Charles Palm, who remarked that "With the establishment of tolerances for a number of pesticides last spring, it was apparent that state recommendations for their use must conform to a definite residue limit at harvest, provided residues remained. It is fair to say," he remarked, "that not too many of the land grant colleges had or have the detailed residue data that would be desirable for this purpose. On the other hand, industry has provided them with sufficient data, plus the fact that we have an extension on the effective dates for tolerances on some pesticides which has carried us through 1955 without too much difficulty."

As to the role of the grower, Dr. Palm pointed out that "A real problem exists with growers who find resistance to recommended chemicals is allowing pest infestations to develop. Quite understandably the growers want a more effective pesticide to save their crop. Perhaps they know one is available for other uses, but we cannot recommend it for a crop for which no tolerance is established or registration granted. The whole problem of grower education is a continuing one and under the Miller Bill, it assumes even greater significance than before."

(*Continued on Page 95*)

Editor's Note: For a more comprehensive coverage of Dr. Palm's view's, the reader is referred to comments by Dr. Palm, appearing in the September issue of *Agricultural Chemicals*.

MATERIALS HANDLING



Figure 1

at Southern States Phosphate Co.

OPERATIONS at the fertilizer plant of Southern States Phosphate & Fertilizer Co., Savannah, Ga., consist almost 100% of material handling by conveyor belts. Huge quantities of light-weight, fine materials are weighed, mixed, stored, bagged or loaded into freight cars. Several methods and devices have been developed at the Southern States plant that may be useful in other bulk handling operations.

A system of movable and fixed conveyor belts provides a means of carrying ingredients into the plant, placing in any one of a large number of storage bins, delivering to the weighing station, returning to storage or to bagging or to freight cars. A long fixed belt runs high up in the plant perpendicular to the tracks at the railroad siding. Two movable conveyors mounted on tracks receive material from the fixed conveyor and place it in bins according to the position of the movable conveyor.

The mixing phase starts at the scale hoppers. Each of the seven hoppers (Figure 1) hold 20 tons of an ingredient. Weighed amounts of each component (in 1½ ton increments) are dropped onto the 30 in. wide, 60 ft. long conveyor belt running under the hoppers at 280 fpm.

Being light and fine, excessive loss of the carefully weighed components as dust and spillage from the belt is reduced to negligible amounts by skirt boards which form a seal with the belt when material is being carried. As shown in Figure 2, the skirt boards are made of an old conveyor belt attached to wooden frame work. When no material is being carried, the skirt boards do not track the belt. When material is dropped out of the belt from a scale hopper, it forces the flexible skirt boards to form a seal with the conveyor belt and prevents spillage and dust. The skirt boards are only in contact with the belt when material is being carried. The skirt board runs the full 60 ft. length of the conveyor.

The ingredients are delivered by the horizontal belt (Figure 1) to a vertical bucket conveyor which elevates the material 45 ft. to a mixing drum which feeds to a screen. The long fixed conveyor takes the completed fertilizer from the screen to either of two movable conveyors which carry it to the desired bin, if it is to be stored. The movable conveyors deliver to bins on either side of the building. The conveyors are mounted on a wheeled carrier designed and built by Southern States which run on tracks extending 450 ft down the length of the building. The conveyors are moved by winches attached to the axle of the driver pulley (Figure 3).

Excellent use is made of slingers or trimmers. The unit shown in Figure 4 is powered by a 5 hp. motor and can handle 60-80 tph. on its 24" belt. It is useful in filling all parts of a large bin with one setting of the shuttle conveyor (Figure 3). It can build a pile 35 ft. away 9 ft. high.

The high speed of the slinger belt (2100 fpm), the relatively small diameter of pulleys (8") and the short center distance of the pulleys caused extremely high belt mortality; however a change in belt specifications from a standard heavy conveyor belt to a modification of the flat belt used in power transmission solved this problem.

Southern States makes good use of a small slinger unit with a 10" belt powered by a 3 hp motor. (Figure 5) This unit is mounted on a monorail running the length of the building. Complete fertilizer or components drop into the hopper and can be placed at a high rate within 35 ft. on either side of the monorail.

Another slinger is used as a carloader. (Figure 6) (The unit is called a swivelloader) Material is conveyed out of the plant on an extension of the fixed conveyor to a large pipe leading into the hopper of the swivelloader. It is mounted on a swivel on a post and can be positioned to load both ends of the car on each track.

The system of conveyor belts and slingers has reduced man-hours and cost appreciably.★★

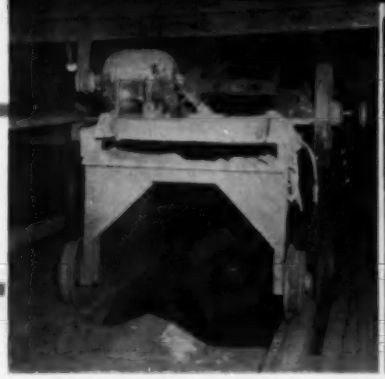


Figure 3



Figure 4



Figure 6

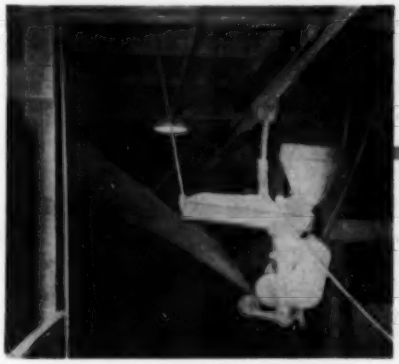


Figure 5

Figure 1: Fertilizer components are dropped in weighed amounts from the scale hoppers onto an enclosed conveyor belt in the first phase of handling.

Figure 2: Diagram of Hopper-Conveyor-roller.

Figure 3: Shuttle conveyor moves on rails to reach any one of several bins on either side of the fixed conveyor. The conveyor carriage is moved by a winch attached to the driver pulley shaft and a rope.

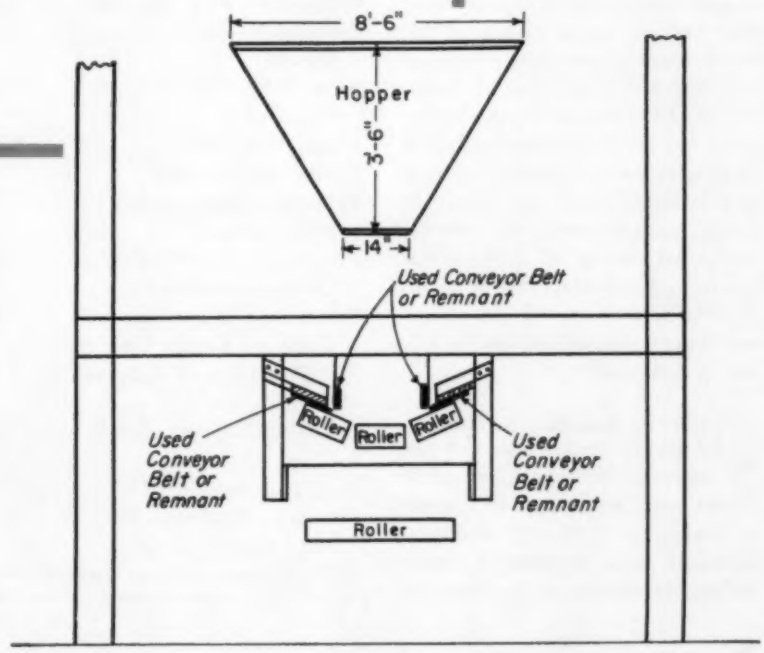


Fig. 2

Figure 4: This slinger unit receives material from the shuttle conveyor and delivers it in a pile 9 ft. high up to 35 ft. from the slinger. A special belt, combines qualities of transmission belt and conveyor belt.

Figure 5: Another slinger is mounted on a monorail to deliver fertilizer into bins on either side of the monorail. Material is dropped into slinger hopper from shuttle conveyor.

Figure 6: The slinger is used to load cars. Material comes from plant on fixed conveyor belt and down pipe into slinger hopper. Slinger can be swiveled to load both ends of the car.

Stability
Compatability } **DATA ON**
Technological

MALATHION FORMULATIONS

By **J. F. Yost, J. B. Frederick and V. Migrdichian**
American Cyanamid Co., New York

PART II

Stability of Dusts

A NUMBER of different types of diluents have been evaluated for use in the preparation of 4 to 5% malathion dusts. Most of the mixtures were made by dilution of a 25% dust concentrate on either Barden Clay-Celite 209 or Pikes Peak 9T66 clay, using various diluents such as pyrophyllite, talc, gypsum, etc. Dilute formulations of malathion were also prepared directly on Attaclay and CCC diluent. Stability results obtained are given in Table V.

In general, the long-term stability of malathion is satisfactory in dilute dust preparations. The most promising diluents are pyrophyllites such as Pyrax ABB and Pyrolyte, neutral talcs, gypsum and possibly certain calcium carbonates. CCC diluent is a treated calcium carbonate, and malathion was surprisingly stable thereon even though the carrier is somewhat basic in nature. Most of the above formulations were prepared with 90% malathion technical. However, the CCC based mixture was prepared with 95% malathion technical. Increase in purity of malathion may be a favorable factor with regard to stability during storage of formulations. An overage of 0.5% actual malathion is recommended in dilute dusts to compensate for the typical loss in grade encountered during a 2-year period of storage.

Stability of Malathion Emulsions

STABILITY studies were also carried out with flowable and dilute emulsions of malathion. In a series of studies in which 1% malathion emulsions were prepared in water buffered to various acidities over the pH range 2-7.2, good chemical stability of the insecticide was obtained for at least 7 months. Addition of sugar to the aqueous media had no detrimental effect on stability of malathion. Good chemical stability of malathion was also obtained in a 50% flowable emulsion. These findings are somewhat surprising, since as was shown in Table III water induces breakdown of malathion in certain wettable powder formulations. It is possible that in emulsions of malathion the emulsifier forms a protective layer on the surface of the malathion oil droplets, thus shielding it from the hydrolytic action of water. Indications are that to induce breakdown of malathion, a combination of conditions is necessary, involving both moisture and a catalytic surface such as that found for certain clay carriers.

Malathion Compatability

AS previously mentioned, the unique combination of insecticidal ac-

TABLE V
Stability of Malathion Dilute Dusts

Diluent and Source	% Malathion Initial	3 mo.	6 mo.	9 mo.	12 mo.	24 mo.
Pyrax ABB—R. T. Vanderbilt Co.	5.0	—	—	4.8	—	—
Pyrax ABB—R. T. Vanderbilt Co.	5.4	5.3	5.3	—	5.0	4.8
Pyrophyllite—Carolina Pyrophyllite Co.	5.0	—	—	5.5	—	—
Snow White Filler—U. S. Gypsum Co.	5.3	5.2	5.1	—	4.7	—
Pyrax ABB—10% Dusting Sulfur—70%	5.5	5.2	4.6	4.9	4.4	—
Pyrolyte—Huntley Industrial Minerals Inc.	5.2	5.0	4.8	—	4.4	4.1
Pyrophyllite 29—Whittaker, Clark and Daniels Co.	5.4	5.1	5.2	—	5.1	4.9
Talc 1094—Whittaker, Clark and Daniels Co.	5.4	5.1	5.2	—	4.9	4.8
Vee Dust Filler—Cal. Spray Chemical Co.	5.3	5.0	5.0	—	4.7	—
Cellite SSC—Johns-Manville Corp.	5.3	5.3	5.2	—	4.9	—
Rock Phosphate—ACCO	5.5	4.6	4.5	—	3.9	—
Attaclay—Attapulgus Minerals and Chemicals Corp.	5.2	—	3.1	2.0	—	—
CCC Diluent—Calcium Carbonate	4.0	4.0	—	3.9	4.0	—

TABLE VI

Compatibility of Malathion With Various Fungicides

Fungicide and Source	% Fungicide or formulation	25% Malathion w.p.	% Malathion Initial	3 mo.	6 mo.	9 mo.	12 mo.	24 mo.
None	—	20	5.0	5.0	4.7	—	4.6	4.3
Captan, technical—Niagara Spray-Chemical Corp.	10	20	4.3	4.5	—	4.3	4.3	—
Captan, 50% w.p.—Niagara Spray-Chemical Corp.	20	20	4.3	4.6	5.0	—	4.2	4.1
Dithane Z-78—Rohm & Haas Co.	10	20	5.0	4.6	4.5	—	2.9	1.2
Dithane Z-78—Rohm & Haas Co. Celite SSC—Johns-Manville Co.	8 15	5% tech. malathion	5.3	4.5	—	3.5	3.3	—
Parzate—DuPont Co.	40	60	15.0	14.1	13.0	10.3	5.0	—
Fermate—DuPont Co.	60	40	9.7	9.0	8.8	7.5	none found	—
Fermate—DuPont Co. Celite SSC—Johns-Manville Co.	10 15	5% tech. malathion	5.1	4.2	—	1.1	—	—
Delmo-Z—Calif. Spray Chem. Corp.	10	20	5.1	4.7	4.7	—	4.3	3.5
Basic Zinc Sulfate—Florida Agric. Supply Co.	10	20	4.9	4.8	4.5	—	4.2	3.6
Basic Zinc Sulfate—Florida Agric. Supply Co. Dusting Sulfur	22.7 50.0	20	4.6	4.6	4.5	—	4.2	3.8
Zinc-Coposil—Calif. Spray Chemical Co.	10	20	5.0	4.5	4.4	—	3.7	2.8
Wettable Sulfur—Unknown	60	40	10.1	9.1	9.2	9.7	7.6	—
Wettable Sulfur—Dow Chem. Co.	60	40	10.0	8.0	—	7.2	8.1	—
Wettable Sulfur—Stauffer Chem. Co.	60	40	10.7	9.5	—	9.8	9.2	—
Superfine sulfur Dust—Miller Chem. Corp.	40	20	5.0	4.8	—	4.8	4.8	—
COCS—Niagara Chem. Corp.	12.5	20	3.9	1.4	1.2	—	—	—
Copper Hydro 40—Chipman Chem. Co.	27.0	20	4.6	1.7	1.0	—	—	—
Tribasic Copper Sulfate—Tennessee Copper Corp.	13.2	20	3.9	2.6	0.6	—	—	—
Tribasic Copper Sulfate—Phelps Dodge Dusting Sulfur—unknown	13.2 65.0	20	4.6	3.2	1.2	0.5	—	—
Copper A—E. I. DuPont de Nemours	15.6	20	5.1	4.0	3.6	3.0	—	—
Cuprocide 54—Rohm & Haas Company	14.3	20	4.8	4.7	4.6	4.4	4.5	none found
Arasan SF—DuPont	10	20	5.1	4.9	4.6	—	none found	—
Thiram 50% w.p.—Sharples Chem. Co.	20	20	4.3	3.3	2.9	—	none found	—
Spergon—U. S. Rubber	12	20	4.5	5.2	5.3	—	4.7	4.2
Puratized Agricultural Spray—Gallowhur Chem. Corp.	10	20	5.1	4.1	3.6	2.9	—	2.3
PMAS—W. A. Cleary Corp.	10	20	4.9	3.9	4.3	3.6	—	3.6

tivity, low mammalian toxicity and rapid disappearance of insecticide residue after application makes malathion an insecticide admirably suited for use on fruits, vegetables, and other garden crops by both commercial growers and homeowners. In many applications combination of malathion with fungicides, other insecticides, or soluble fertilizers is highly desirable from the standpoint of a more efficient pest control and an all purpose fruit and garden spray composition. These potentialities have prompted the exploration of the long-term compatibility of many different preparations of malathion-containing fertilizers and other pesticides.

Compatability with Fungicides, Insecticides, etc.

MALATHION compatibility evaluations for 26 different dilute dust formulations containing many of the present commercial fungicides are given in Table VI. Formulations were prepared by mixing either technical fungicide or a commercial formulation thereof with a 25% malathion wettable powder prepared on either a Barden Clay-Celite 209 or a Pikes Peak 9T66-Celite SSC carrier and diluted with an appropriate amount of Pyrax ABB.

The results, Table VI, show that in the dry formulations studied, malathion is reasonably compatible for one to two years with captan, phygon, spergon, Delmo Z, basic zinc sulfate and dusting sulfur. Short-term shelf-life, approximately six months, can be obtained with a large number of other fungicides. Malathion possesses very poor stability when formulated with soluble coppers. Use of certain conditioning agents as found in some wettable sulfurs also induces breakdown. Metal ion catalysis, basicity, and moisture are among the factors believed responsible for poor compatibility in the latter type formulations. In some cases an apparent initial drop in grade (initial analysis for malathion lower than calculated value) has occurred. The change in grade noted may be real but is more likely due to analytical or preparation anomalies.

Some work was done on the long-term compatibility of malathion with other insecticides when formulated as a dilute dust. Findings with 10 different insecticide combinations are recorded in Table VII. As with the malathion-fungicide preparations the formulations were prepared by mixing a 25% malathion wettable powder and the appropriate insecticide or formulation thereof, and then diluting with Pyrax ABB.

The data in Table VII show that, when properly formulated, malathion is reasonably compatible with chlorinated hydrocarbon type insecticides Karathane and Ovotran. Fair compatibility was found for toxaphene, Sulphenone and Aramite combinations. Neutral calcium arsenate caused fairly rapid breakdown of malathion during storage.

Combinations containing malathion and both insecticides and fungicides were also investigated. Preparations were made by mixing malathion 25% wettable powder with the various pesticides or formulations thereof and then diluting with Pyrax ABB. Compatibility results of eleven compositions are given in Table VIII on page 104.

It will be noted that compatibility results here are similar to those obtained for the corresponding malathion-insecticide or malathion-fungicide mixtures previously discussed. Long-term compatibility of malathion in the malathion-captan-Methoxychlor formulations is very good. As expected, malathion decomposes fairly rapidly in combinations containing metal salts of the dithiocarbamic acid fungicides such as ferbam or manzeb.

While it is true that alkaline substances and divalent metal ions in general catalyze or induce decomposition of malathion, especially in its formulations, the insecticide can be mixed and used quite successfully in the spray tank with most commercial pesticides, including soluble coppers, zineb, ferbam, etc., as well as with mildly alkaline substances.

Data on the compatibility of malathion with a number of nutrient and conditioning materials have also been obtained and are given in Table IX. Good compatibility was found in compositions containing potash, $MgCO_3$, gypsum, superphosphate and urea type plant nutrients. Rapid decomposition occurred in the presence of rock phosphate.

Considering the various compatibility results obtained, malathion is reasonably stable with a considerable number of pesticides and fertilizer materials. Basic substances and materials containing certain metallic ions induce fairly rapid breakdown of malathion. Dusting sulfur tends to stabilize formulations of malathion.

(*Continued on Page 105*)

TABLE VII

Compatibility of Malathion With Various Other Insecticides

Insecticide and Source	Percent Used in formulation	% Malathion Initial	3 mo.	6 mo.	9 mo.	12 mo.	24 mo.
Ovotran 50% w.p.—Dow Chemical Co.	20	4.9	4.6	4.5	—	4.3	4.6
Sulphenone 50% w.p. Stauffer Chemical Co.	20	5.1	4.3	4.2	—	3.7	3.3
Aramite 15W—U S. Rubber Co.	10	4.8	4.7	4.7	—	4.3	3.4
Karathane WD-25%—Rohm & Haas	4	4.5	—	4.3	—	4.5	—
Neut. Calcium Arsenate—Woolfolk Chem. Works	80	4.7	3.6	3.2	—	2.5	—
Lindane, technical— Gen. Chem. Div. of Allied Chem. & Dye Corp.	10	4.7	4.4	4.3	—	4.3	—
Chlordane, 40% w.p.—Stauffer Chem. Co.	20	4.8	4.9	4.7	—	4.5	4.1
DDT, technical—DuPont	10	5.0	5.0	4.8	4.8	—	4.6
Methoxychlor, 90% conc.—DuPont	10	5.1	4.8	4.8	4.8	—	4.5
Toxaphene—40% dust—Hercules Powder Co.	25	4.9	4.6	4.4	—	3.8	3.4

Major Trends in the Pesticide Industry

its needs
its problems
its future growth and development

By Warren Moyer*
President, Chipman Chemical Co.
Bound Brook, N. J.

THE beginnings of the pesticide industry were perhaps rather haphazard, and certainly great new horizons were opened when the broad group of new pesticides was gradually introduced following the second World War. These new products were the result of, but also provided great stimulus to, research. The new range of products has presented many problems to our production and sales people, but certainly has pumped a lot of new blood through our veins and caused a growth that has made the industry anything but stagnant.

Apart from this significant development of research and technical service, it seems to me that two of the most important factors which have affected our industry are: the introduction of a great many new companies into the business, particularly some very large chemical manufacturers; while on the other hand, the nature of the products involved and their formulation and methods of use have resulted in development of a great many small companies, mixing and formulating basic chemicals produced by others. Certainly no one can deny the essentiality of the large chemical manufacturer with basic chemical production facilities and large technical staff; at the same time I don't believe anyone can properly deny the place of the small mixer and formulator who serves at a local level.

It is inevitable that with so many new factors involved, time is required for the proper integration of these various activities to their most efficient functions and relationships. There is another important integration involving research, production and formulation extending beyond the borders of the United States and including activities of our neighbors in Canada and Mexico; in South America and quite notably in England and Germany; and in many other parts of the world. The establishment of these channels of information and activity will certainly lead to a beneficial flow of ideas as well as materials in both directions between the United States and many other countries.

We in the United States have perhaps a particularly outstanding problem with the development of highly mechanized agriculture. A measure of this development is brought out by the Bureau of Census figures, indicating that currently eleven percent of the population are employed in agriculture, whereas in 1914 there were thirty percent of our workers employed on farms. We know that throughout the world, more crops must be raised on limited useful acreage, in spite of the opening of new areas for more efficient farm production. We have seen a great deal of this in the United States with the opening of our great irrigated farmlands, but some of us do not fully realize how this same movement is proceeding throughout the world. For some reason I was particularly struck with the description of water-power development in French North Africa which, in spite of its political troubles, is opening up 344,000 valuable acres to irrigation.

Whether we are associated with these world-wide activities in the export and import of commodities or in the export and import of ideas, it is certainly of first importance that we should maintain worldwide contacts and channels within our industry. We all know that pesticides generally are used to a much lesser extent than economics justify, and we have an ever present challenge to find ways of further developing the efficient use of our products for the benefit of agriculture and for the development of our industry in a healthy manner.

Of course we all know the impact of varying seasonal conditions, plus the effect of reduced unit prices; nevertheless, it seemed to me surprising that the U. S. Tariff Commission figures indicated the consumption of organic chemicals in agriculture had gone down since 1951 from 150 to 118 million dollars. (No doubt the price of DDT was a factor.) It would seem to me the trend should be much more strongly and uniformly in the other direction. Have we possibly taken too much for granted as to the desirability of pest control, and failed to make as good a case as we might to prove the net practical economy to the individual farmer?

Our government is a very important partner in agriculture as we all know. The government currently has an investment of some seven billion dollars in agricultural products, and has extensive and highly-trained organizations to deal with practically all phases of agricultural problems. Naturally the relations of our industry with interested government officials are many and complex. For the most part, I am happy to say they seem to be good relations, . . . constructive and valuable on all sides. I believe our industry can be proud of the fact that it has carried its responsibilities well,

*Address given at the 22nd annual meeting of NAC, Spring Lake, N. J., Sept. 7-9.

and has earned the confidence of government officials as well as of agriculture generally.

Among these prime responsibilities have been the maintenance of adequate production facilities, and inventories of materials to insure against the farmer's ever being caught short of needed pest control chemicals. During the war when many of our raw materials were in short supply, suggestions were advanced to the effect that the government could, more effectively than industry, maintain reserve inventories to protect the farmer, and could more efficiently direct production to centralized and highly efficient manufacturing plants, eliminating many smaller or less efficient units. Fortunately, these suggestions were not seriously entertained, but they firmly impressed on my mind, the great importance of our industry's protecting the farmers' requirements even at the cost of high inventories, which we sometimes find burdensome to carry.

There are occasionally indications that some of the newer and particularly the larger companies in our industry are not fully aware of the attitude which must be taken toward this inventory problem and many polices are affected. Naturally, those whose experience has been primarily with industrial chemicals, or products having a fairly level flow of demand, do not always at first fully understand the fact that in the pesticide business, demand is created not only by demonstration that a product will perform its function, but beyond that, that demand is controlled by the question of whether or not the function is necessary at the moment. In other words, you can't sell an insecticide to a farmer who doesn't have any insects to kill, and no amount of price reduction or sales effort will move the chemical to the farmer until he needs it. Then he needs it badly, and quickly.

We must recognize the inventory problem as part of the basic nature of our business, and not let it distort our policies. This perhaps ties into the oft-repeated phrase we hear from suppliers, competitors and customers: "We are not getting our share of the business." What is his share of the business? And how does he determine it, except by desire and some arbitrary formula? To my way of thinking, no company has a share of the business, except as they earn it by performing an efficient service, and developing the demand for that service and the product which they offer in connection with it.

We are a small but highly specialized segment of the chemical industry . . . and actually a small segment of the agricultural chemical industry; however we are unique in our need for intelligent and capable personnel in the field, both of a technical and commercial character. We are also in some ways unique in that we have not only lived with, but helped to formulate many facets of supervision and control by the government for the protection of the farmer. Our formulae and specifications of our products are almost entirely a matter of public information, so that we enjoy a minimum benefit from establishment of reputation and from the nature of trademarks, labels and the usual qualities of proprietary products. I believe there are very few cases in industry where the consumer, and even the farmer as a semi-industrial consumer, buys products on industrial specifications, rather than on proprietary descriptions backed by reputation, advertising and confidence in the manufacturer. At the same time, our industry is made up of many companies whose policies are established, and whose management-thinking is trained in the direction of industrial sales and industrial consumption, where merchandising and selling methods are very different than they are in the consumer sales and particularly sales to agriculture.

How many times do we see basic chemical manufacturers selling technical materials opportunistically—through channels ill-equipped with experience or staff to render proper service, and without the costs thereof,—with the result that their technical product goes into a formulated product to be sold at a price with which the basic manufacturer himself can scarcely compete? Actually it seems to me that with all the talk about evils of our competitors, we should all be careful to see we are not reaching out to cut our own throats, while desperately trying to steal our competitors' established business. If we keep our eye in the direction of the development of business, based on service and efficiency, we will not have to *seek the channel of endeavor which consists of simply trying to steal business developed by others.*

Some people seem to feel that the way to develop additional business is to buy it outright. One $634,000,000 unit in the chemical industry has been developed as the result of sixteen acquisitions in the past five years. Another somewhat less ambitious, involving a $224,000,000 unit, has been made up of fourteen acquisitions in that same five year period. I have no criticism of this trend toward merger and acquisition; certainly a great volume of production has led to great development in the chemical industry, and many of our developments would be impossible without huge financial structures to carry the burden of building costly plant facilities large enough for a high degree of efficiency.

This question of size is one which, to me, should be judged entirely on the merits of its performance. It can be, of course, that the much-discussed question of intra-company costings works a hardship on the smaller or more independent manufacturer. I strongly believe it is only healthy that every chemical manufacturer, large or small, should scrutinize departmental and actual costs as straightforwardly and honestly as possible. I have heard it said that some companies would carry agricultural chemicals at a loss with complete indifference, because the volume isn't very large in proportion to their total volume, and it is an important public relations factor in their overall picture. It does not seem to me that such policies are healthy, if they do exist, and they must ultimately be revised.

I have also heard it said that one trouble with the pesticide industry

(*Continued on Page 98*)



NAC Grows with the Industry

by Lea S. Hitchner
Executive Secretary
National Agricultural Chemicals Association

SO far 1955, like its predecessor, has been a year of growth for the National Agricultural Chemicals Association and for the pesticide industry.

Membership in the Association has remained high, and increases in the sales of industry products have been reported. But it is not in statistics alone that growth can be measured. The prestige of the industry in the eyes of the general public and the services the Association supplies to the industry are also measurable.

A review of the statistics covering the 22 years since the Association was founded however, serves as a good reference point in discussing the services rendered in 1955. In general terms, the pesticide industry and the Association have experienced a material expansion during this period.

Since 1933, sales of industry products have risen from $54 million to an estimated $250 million. Similarly, Association membership has increased from 14 companies, all manufacturers of basic chemicals, to 137 companies, including many of the pesticide formulators who have come into the industry since World War II. Membership in the Association is, of course, open to basic manufacturers and to formulators or reprocessors.

NAC member companies produce more than 85 percent of the basic pesticide chemicals and more than 65 percent of the formulations manufactured in the United States. All this, while impressive, represents past growth. Now, what about the present?

The dominant new factor in the industry in 1955 was the Miller Amendment to the Food, Drug and Cosmetics Act of 1938. Since this law directly affects everyone who manufactures or uses pesticides, there arose a need for accurate, up-to-date information on the Amendment.

This situation illustrates as well as, and possibly better than, any other how the NAC Association serves the industry. When the Miller Amendment was passed, it was recognized that industry members would have to have information on it. To answer this need the Association this year compiled the Food and Drug Manual containing full informtaion on the Miller Amendment, regulations under it, and interpretations by the Association's various legal and technical committees. So rapidly have new developments been coming along under the Miller Amendment, that to date 65 bulletins, nearly two per week, have been issued to keep the manual up to date.

No specific dollar value has been placed upon this service, but it is apparent that it is a service which individual companies would have to perform themselves if it were not available from the Association. As such, we feel that the Food and Drug Manual represents a dividend to companies which invest in Association membership, particularly since this service is available from no other source.

While not considered as new services, industry members continued to receive supplements to other Association publications important to the daily operations of their businesses. Five supplements, for example, were issued for the Association's oldest manual, the Law Guide, or more accurately, the Guide to the Laws Affecting Insecticides, Fungicides, Rodenticides, and Related Products.

The main features of the Law Guide, for those who may not have seen it, include a chart of federal and state law affecting pesticides, analyses of the laws, and a summary sheet indicating how to comply with the laws in registering products for sale. Recently, one of our new members referred this manual to his legal department, and learned that it would have cost from $5,000 to $10,000 to have it duplicated in the legal department.

Other publications available to the industry during the year were the Product Liability Manual, the only compilation of liability cases pertaining to pesticides; and the Herbicide Law Manual, which includes all the laws pertaining specifically to the use and application of herbicides. In this new and rapidly growing field of herbicides, both sales and use are threatened by ill-conceived legislative controls, so this summary of laws is particularly important. Both manuals are kept up to date by annual supplements.

Earning goodwill: While publications, such as the manuals and some 300 bulletins of various topics the Association sends out to members each year are tangible services, there are many others, such as promoting good-

(Continued on Page 99)



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GREENHOUSE EVALUATION AND NITRIFICATION CHARACTERISTICS OF BIURET AND UREA-BIURET MIXTURES

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TEMPERATURES encountered in the manufacture and processing of urea can result in partial decomposition of the urea to biuret. The biuret content of samples of pelleted urea analysed in the laboratory at Beltsville, Md., ranged from approximately 1.3 to 1.5 percent for domestic products, to as high as 5.0 to 5.5 percent for some products of foreign origin. In comparison, samples of domestically produced crystal urea were found to be free of biuret. In order to obtain information on the agronomic effects of biuret, a study was made of the influence of soil applications of this compound on the growth of several crops in the greenhouse, and its nitrification characteristics in soil media were compared with those of urea.

Subsequent to the beginning of this work, the effects of urea-biuret mixtures, both in foliar sprays and soil applications, have been reported in several papers. Sanford et al. (10) applied solutions of urea, biuret, and urea-biuret mixtures to pineapple plants as 4.2% foliar sprays. When measured two months later, leaf-tip die-back and chlorosis were correlated with the amount of biuret added. Urea containing 3% or more of biuret also produced dieback and yellowing. Oberbacher (8) reported that biuret applied either as a foliar spray or to the soil caused chlorosis to orange trees and seedlings. He indicated that the chlorotic pattern developed within about three weeks after application in summer but was delayed as long as fifteen weeks in winter. Funabiki et al. (1) found that at a given concentration and application rate of biuret to the soil, the injurious effect was greater on barley and wheat than on paddy rice. Okuda (9) also indicated that injury was greater on wheat than on rice. He reported further that there was more injury from band placement than from mixing with the soil and that injury was more apt to occur during the winter than the summer months.

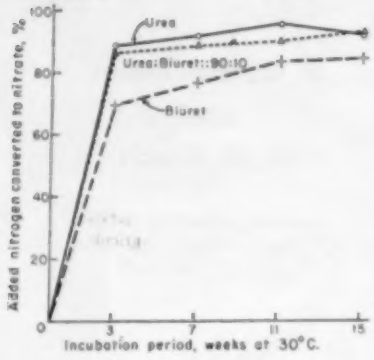
Jones and Embleton (6) (7) repored that when a solution prepared from pelletized urea was sprayed on orange leaves, "yellow tip" appeared in 2 to 8 weeks. Preliminary field and greenhouse trials comparing sprays prepared from pelletized urea, crystal urea, biuret, and crystal urea plus biuret indicated that biuret was the material causing the injury. Jones (5) reported further that in a greenhouse experiment, pelletized urea, crystalline urea, and biuret either as 2% urea solution, 0.2% biuret solution, or a combination of the two were sprayed on young budded lemon and Valencia orange trees in customary quantities. In another experiment with the same type of trees, 50 ml. of each of these solutions were applied to 1-gal. cultures of soil. Yellow-tip resulted from the spray as well as from the soil applications of pelletized urea, biuret, and the biuret-crystal urea combination but not from the crystal urea. Haas and Brusca (2) (3) grew lemon cuttings in silica sand cultures and avocado cuttings and seedlings in soil cultures and applied a complete nutrient solution containing varying amounts of biuret. Toxic effects on the leaves were noted within a few days after nutrients containing 50 ppm or more of biuret were applied. Stewart and Hield (11) (12) reported that a spray containing 5 pounds pelletized urea in 100 gallons of solution under some conditions might induce a slight yellow tipping of orange tree leaves several weeks after application. This however was found not to reduce yield or quality.

Experiment with Perennial Ryegrass

BIURET was applied to 2-gallon pots of Evesboro sandy loam soil at rates between 0 and 40 lb. N per acre. The biuret along with 50 lb. N per acre as ammonium sulfate, 100 lb. P_2O_5 per acre as superphosphate, and 150 lb. K_2O per acre as potassium chloride was mixed throughout the soil, which had been limed with sufficient dolomitic limestone to raise the pH to 6.5. The fertilization of the cultures as well as planting of the ryegrass took place in mid-December. Three replications in randomized block design were used. The first clipping of ryegrass was made 52 days after planting and the second clipping was made 29 days later.

The treatment with 50 lb. N. per acre as ammonium sulfate was chosen as a standard of comparison, since

Figure 1. Rates of nitrification of urea, biuret and a urea biuret mixture in the laboratory.



previous experiments had indicated that while this gave a good growth of ryegrass on the Evesboro soil used, the crop would still give a good response to additional N applications. Thus at this rate of application both the detrimental and beneficial effects of biuret on crop yield could be determined.

The results of the first experiment are presented in Table 1. The data of the first clipping indicated that additions of biuret up to 16 lb. N per acre gave neither an increase nor a decrease in yield of plant material when 50 lb. N per acre as ammonium sulfate was already present. The addition of 30 or 40 lb. N per acre as biuret however, gave a significantly lower yield. At the second clipping, the 8 lb. additional biuret N per acre gave no significant difference in yield whereas the 16, 30 and 40 lb. additional biuret N per acre treatments gave highly significant increases in yield over the one with ammonium sulfate alone. The total yield of both clippings was greater with additions of biuret N up to 30 lb. per acre than with ammonium sulfate alone. With 40 lb. of biuret N per acre, the combined yields were significantly lower than with the ammonium sulfate alone.

Corn, Cotton, Tomatoes and Oats

UREA alone and urea-biuret mixtures containing up to 10% by weight of biuret were applied to 2-gallon pots of Evesboro sandy loam soil at the rate of 100 lb. N per acre. The nitrogen materials along with 200 lb. P_2O_5 per acre as superphosphate and 150 lb. K_2O per acre as potassium chloride were mixed throughout the soil which had been limed with sufficient dolomitic limestone to raise the pH to 6.5. The fertilization of the cultures as well as planting of the crops took place on May 5. Four plants per culture of corn, cotton and tomatoes and 11 plants per culture of oats were grown. A randomized block design with four replications and split plot with respect to crops was used. All crops were harvested 36 days after planting.

The oven-dry weights of the plant material are presented in Table 2. There were no significant differences in yield between treatments varying from urea alone to urea-biuret mixtures containing up to 10% biuret by weight. There was no significant interaction between crops and treatments.

Nitrification Characteristics

THE degree of nitrification of urea, biuret and urea-biuret mix-

(*Continued on Page 103*)

TABLE 1.

Yield of Perennial Ryegrass Fertilized with Variable Amounts of Biuret

Lb. N per Acre Applied As		Oven-Dry Wt., Grams per Culture		
Ammonium Sulfate	Biuret	First Cutting	Second Cutting	Sum of Two Cuttings
0	0	0.78	0.67	1.45
50	0	4.94	2.83	7.77
50	8	5.22	3.40	8.62
50	16	4.40	4.04	8.44
50	30	3.15	6.27	9.42
50	40	0.29	4.99	5.28
LSD 5% level		0.98	0.89	0.98
LSD 1% level		1.33	1.21	1.33

All values are averages of three replications.

TABLE 2.

Yield of Several Crops Fertilized with 100 Pounds N per Acre in the Form of Urea-Biuret Mixtures

Percentage by Weight in the Mixture		Oven-Dry Weight of Plant Material Grams per Pot			
Urea	Biuret	Corn	Cotton	Tomatoes	Oats
100.0	0.0	20.1	4.14	12.8	6.64
99.5	0.5	24.2	3.68	12.9	7.36
99.0	1.0	23.2	3.69	13.1	7.32
96.0	4.0	22.7	3.70	15.3	7.64
90.0	10.0	21.8	3.62	14.2	7.87

All values are averages of four replications.
No significant differences between treatments.

TABLE 3.

Degree of Nitrification of Ammonium Sulfate, Urea, Biuret and Certain Urea-biuret Mixtures Added at 400 Pounds Nitrogen per Acre

Nitrogen Source		Incubation Period in Weeks 3[a]	7[a]	11[a]	15[b]
		Percent of Added Nitrogen Converted to Nitrate			
Ammonium sulfate		89.2	90.3	97.7	86.6
Urea		88.7	92.1	96.3	88.2
Urea, 99.5% Biuret, 0.5%		89.7	90.5	96.2	88.7
Urea, 99.0% Biuret, 1.0%		87.4	89.8	94.4	91.4
Urea, 96.0% Biuret, 4.0%		87.4	92.2	94.3	92.5
Urea, 90% Biuret, 10%		87.2	89.0	90.7	89.1
Biuret		69.2	76.9	84.3	85.8
L.S.D.	5%	6.4	5.4	4.1	3.0
	1%	9.7	8.2	6.2	4.0

[a]Average of two replications.
[b]Average of five replications.

American Chemical Society Pesticide Reports

AT its 128th annual meeting, September 11-16, 1955, the American Chemical Society welcomed some 2500 members and guests at the University of Minnesota, Minneapolis. The following abstracts review some of the reports presented at the meeting of the Division of Agricultural and Food Chemistry. For abstracts given at the Division of Fertilizer and Soil Chemistry see *Agricultural Chemicals*, September, pp. 114-116.

A New Series of Fungicidally Active Alkylenebisdithiocarbamates. Oren F. Williams and Jack R. Graham, Niagara Chemical Division, Food Machinery and Chemical Corp., Middleport, N. Y.

A number of carboalkoxy and carbophenoxy alkylenebisdithiocarbamates have been found highly active as foliage fungicides. These derivatives were generally obtained in excellent yields by interaction of the appropriate alkyl or aryl chloroformate and the sodium salt of an alkylenebisdithiocarbamic acid.

It was found that halogen substituents in the alkyl radical of the carboalkoxy group of negative substituents in the aromatic nucleus of the carbophenoxy group gave derivatives good stability and fungitoxicity. S, S'-Bis-(carbo-β-bromo-ethoxy) ethylene-bis-dithiocarbamate has been found to be one of the most fugitoxic of members of the carboalkoxy series. Carbonitrophenoxy derivatives have given LD-50 values of less the 5 p.p.m. against four different representative organisms in the greenhouse.

Thermal decomposition products of the ethylenebisdithiocarbamate derivatives mentioned above include carbonyl sulfide, ethylenediisothiocyanate, and an alcohol or phenol. The exceptionally high activity of the carboalkoxy and carbophenoxy alkylenebisdithiocarbamates is believed to be associated with their release of highly fungitoxic alkylene diisothiocyanates and alcohols or phenols.

Uses and Effectiveness of Captan. P. D. Peterson and J. T. Bashour, Stauffer Chemical Co., Chauncey, N. Y.

Captan(*N*-trichloromethylmercapto-4-cyclohexene-1, 2-dicarboximide) synthesized by Kittleson (Esso Laboratories) in 1946, was demonstrated to be a promising fungicide by Daines (Rutgers) in the same year. Since then it has proved to be effective against one or more pathogens in at least 54 genera of fungi. Today it is finding a rapidly expanding market as a fungicide on deciduous fruits, citrus, vegetable crops, small fruits and ornamentals, and as a seed treatment and plant dip. Its low mammalian toxicity has made it a favorite in preharvest sprays and postharvest treatments to prevent rots in shipment and storage.

It is rapidly replacing sulfur in the preharvest spray on peaches, cherries, and plums for the control of fruit rots. Among strawberry growers it is the favored fungicide for use between pickings for the control of fruit rot. It is used on apples for the combined control of Scab, Brooks Fruit Spot, Fly Speck, Black Pox, Botryosphaeria Rot, Black Rot, Bitter Rot, and Sooty Blotch. No other fungicide, organic or inorganic, controls all of these diseases so well with so little injury to foliage and fruit. The high quality and high yields of Captan-sprayed apples have made it a standard against which other fungicides are compared.

The Fate of Aldrin and Dieldrin in the Animal Body. James M. Bann, Thomas J. DeCino, Norman W. Earle and Yun-Pei Sun, Shell Development Co., Denver, Colo.

In connection with the widespread use of chlorinated hydrocarbon insecticides, information concerning their fate in the animal body is of considerable general interest. Recent toxicological studies indicate that aldrin is converted rapidly to dieldrin in the animal body. The conversion of aldrin to dieldrin takes place rapidly and is fairly complete. It is assumed to occur in all animals inasmuch as it has

(Continued on Page 95)

On the Miller Law...

LETTER to the EDITOR

THE following communication has been received from the manager of the agricultural chemicals division of a prominent supplier of pesticide raw materials. We believe it offers a number of worthwhile observations on industry operations under the Miller Law.

We believe that considerable real progress has already been made by the industry and by the Food & Drug Administration in learning how to operate under the new Miller Law. Some critics are of course saying that industry has lagged badly in meeting its requirements under this new law, and perhaps others feel that Food & Drug has been negligent in not setting up the necessary standards so that we might all know just exactly what must be done to be in compliance. However, it seems to me that both schools are exaggerating their criticisms a bit. It was bound to take time for all of the interested people to learn how to live with Public Law 518 and it will be many many months more before even the basic questions will be fully answerable.

Industry's research with respect to safety in the use of pesticide chemicals has been very thorough in the past, but it had not been directed specifically with the requirements of the new law in mind. As a result, we can expect that considerable further research will have to be done at sizeable expenditure of money and time, not in order to prove that a certain use is safe, but in order to develop the data required to meet the specific needs of the Food & Drug Administration as administrators of the new law. However, the industry may well find it unattractive to spend the additional money which might be required to meet the specific requirements of FDA for a minor outlet of the chemical. There are uses for these older materials which are completely safe, but for which possibly sufficient data is not available to obtain a tolerance, and where the volume of the use will not support the required research. Recommendations for these uses of the older chemicals will just have to be removed from the label, and the farmer will be deprived of a safe use of the pesticide as a result. Considerable thought must be given by the industry and FDA to minimizing this sort of problem.

No doubt we can expect considerable discussion of the need for establishing tolerances at a level which would, of course, be safe but which would be sufficiently high so as to cover the extreme case of residue retention. The manufacturer, the State Extension Services, and all others concerned with recommendations will be reluctant to make recommendations for the use of pesticides with the knowledge that their recommendations will tend to cause residues close to the tolerance in the majority of cases; for, in a small number of cases, such recommendations could be expected to result in excessive residues, and no one wants the responsibility of making recommendations which might result in illegal residues, even in a minute percentage of the cases.

Certainly all of us concerned with the pesticide business must contribute to a better understanding of the regulations on the part of the farmer. There is a great tendency at the present time even for so-called qualified people to take the stand that a pesticide should not be used on a crop unless a tolerance has been established. The proper attitude would be that a pesticide should not be used in such a way as to leave a residue on a crop unless a tolerance has been established. While in time these points and others may be better understood by the farmer, it is our job to speed this process up to the greatest extent possible.

Public Law 518 can be a great boon to the pesticide industry, not so much as an instrument to control the use, or rather to prevent the misuse of pesticides, but more important, as a tool to use in answering the irresponsible group that have been trying to convince the public that pesticides cannot be used with safety. While the law has already caused us some problems and can be expected to cause us many more, we do not expect it to cause any violent changes in the present pattern of the safe use of pesticides. We hope, and for that matter, we expect that the mechanical difficulties of dealing with the law will not overbalance these very real benefits.★★



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LISTENING
Post

Control of Lettuce Diseases in the Florida Everglades

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, U. S. Department of Agriculture, Beltsville, Md.



By Paul R. Miller

R. S. Cox of the University of Florida Everglades Experiment Station writes that three diseases have placed the lettuce industry in the Florida Everglades in serious jeopardy. These are downy mildew, bacterial soft rot, and breakdown of the midrib and other leaf tissues. Their combined action results in greatly reduced yields. Frequently, entire fields are abandoned. Also, they affect quality as reflected in reduced size and in poor storage qualities.

Downy mildew (*Bremia lactuce*) is the primary and frequently the only disease during the winter months up through February. If cool wet weather persists, as happened in the spring of 1954, the disease may remain a serious problem into March and April.

Fields are sometimes abandoned because of the severity of downy mildew, but reduction in head size is its chief adverse effect. The importance of this is readily seen by the fact that number 5's (5 dozen heads/crate), if they sell at all, will bring only about one-half as much as number 4's or 3's. Obviously, the smaller the head the fewer the crates per acre will be realized.

In a replicated experiment involving six fungicides, zineb was significantly better than any other material (approximately 60 percent increase over the check). Captan (39 percent increase and ferbam (34 percent increase) were second best and significantly better than the check. Tribasic copper sulfate and chloranil gave appreciable disease control, but the beneficial effects were completely nullified by phytotoxicity. PCNB caused severe injury and effected no disease control at all.

Bacterial soft rot, caused by one or more species of *Erwina*, becomes manifest following a period of warm weather. Two distinct phases of the disease are common; namely, "slime head" and "butt rot" or "jelly butt." Both occur in serious proportions in the field and in transit. A grower may be plagued with either or both forms. Possibly different species of the soft rot bacteria are involved; however, differences in cultural and packing practices are believed to be important.

Other investigators have shown that streptomycin sulfate (1000 ppm) is highly effective against bacterial soft rot of packaged spinach. Work was undertaken to determine the effectiveness of streptomycin as a post-harvest treatment against soft rot of lettuce. The commercial product, Agrimycin-100, containing streptomycin sulfate and Terramycin in a 10-1 ratio and manufactured by Charles Pfizer Co., was used in all tests. Also a streptomycin nitrate formulation, Phytomycin, manufactured by Mathieson Chemical Corp., as well as another streptomycin sulfate formulation by Merck and Co., Inc. were used in limited tests. All three products performed equally.

In the experimental procedure, the heads were dipped momentarily in the desired solution, crated and then placed underneath a tarpaulin in an area exposed to direct sunlight, where they were kept for a minimum of 48 hours. Maximum temperature observed under the tarpaulin was 85°F. No artificial inoculations were used.

All concentrations, 50 ppm up to 1000 ppm, were highly and equally effective against both slime head and jelly butt. Infections ranged up to 60 percent in the untreated and from 2 to 9 percent in the treated.

In one test involving a field where jelly butt was the primary disease, butts were painted with a 250 ppm solution of streptomycin as the lettuce was packed in the field. Infection was reduced from 62 percent in the untreated to approximately 4 percent in the treated.

Lettuce of one grower was affected primarily with the slime head form. A test was set up where the heads were dipped momentarily in concentrations of 10, 25 and 50 ppm streptomycin. After 2 days, 85 percent of the untreated heads had become slimy, whereas percentage infection ranged from 6 to 12 in the treated. The 10 ppm concentration was almost as effective as 50 ppm.

Rib breakdown became prevalent in the spring of 1955, after hot weather set in. Brown streaks appeared along the rib and veins of the leaf, later followed by soft rot. The cause of this disease is unknown. It progresses during transit and greatly impairs the lettuce display in the retail market. No attempt at control has been made.

Except for these diseases, the Everglades area is ideally situated for the production of high quality lettuce. Thus, control of these diseases

should provide a real impetus to the industry. A satisfactory solution to the downy mildew problem appears to be in sight.

It would also appear that the bacterial soft rots could be adequately controlled in transit with formulations of streptomycin. However, antibiotics should not be used on leafy vegetables in particular until approval is granted by the Food and Drug Administration. Painting of the butts, where feasible, of such vegetables as lettuce could provide one solution to the problem. Another could be through the use of the material as a dip at very low (10 ppm) concentrations.

Compatibility: Streptomycin and Copper

R. S. COX reports further tests with streptomycin copper combinations at the Florida Everglades Experiment Station. In repeated tests during the 1954-55 season, weekly applications of streptomycin formulations gave commercial control of bacterial spot of pepper *(Xanthomonas vesicatorial)*. Bi-weekly applications were less effective. In a dosage series of 100 to 1000 ppm, effectiveness, as measured by disease severity, increased up to 400 ppm. Yield increases were as much as 50 percent over yields of the checks. The lowest effective dosage was 200 ppm.

The neutral coppers (tribasic copper sulfate and Copper A) also provided an effective degree of control as measured by foliar disease severity. These materials were completely compatible with streptomycin (Agrimycin), and there appeared to be a considerable additive effect when they were used in combination (2 to 4 pounds of neutral copper, approximately 50% active, with 100 to 200 ppm of streptomycin).

Other fungicides (nabam + zinc sulfate, zineb, captan, ziram, and maneb) were ineffective against bacterial spot but did not appear to reduce the activity of streptomycin when used in mixture with it.★★

Corn Earworm Active on Several Crops; Bean, Cotton Pests High

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.



By Kelvin Dorward

THE corn earworm, during late August and early September, was rather noticeable on a variety of crops in various areas of the United States. In early September, small corn earworm larvae were appearing in lima bean fields in Delaware and Maryland. Damage was still light at that time, but sufficient moths were present to indicate an increase in the damage that could be expected. In Delaware, considerable tip injury to sweet corn was caused by the earworm. Infestations in sweet corn were on the increase in Rhode Island and Pennsylvania. States reporting attacks on sorghum include Virginia, North and South Carolina, Georgia, Alabama, Oklahoma and Kansas. Both Texas and Oklahoma reported infestations on peanut foliage, with Delaware and Louisiana reporting infestations in alfalfa. In Minnesota, the insect was more numerous than in 1954, with some south central and central area fields having populations up to 300 larvae per 100 ears. Late field corn in Kansas had infestations ranging up to 96 percent, Colorado reported infestations up to 95 percent in Prowers County. Pupation was getting under way in Colorado, and the populations indicated that trouble might be expected later on tomatoes in certain areas. In sections of Washington County, Utah, infestation in sweet corn ranged from 15 to 100 percent. California reported heavy infestations on field corn in Merced County, as well as infestations in numerous bean fields, causing up to two percent pod injury, and requiring treatment to prevent further damage. Injury to tomatoes by the corn earworm was reported in South Carolina, New Mexico and California.

Other Vegetable Insect Activity

MEXICAN bean beetles were rather active in late August and early September in many areas. This insect was reported as being heavy around Wickford, Rhode Island, troublesome in parts of Michigan and damaging in Goshen County, Wyoming. Alabama reports the beetle to be abundant in most of that state. Heavy infestations occurred on butter beans in Santa Rosa County, Florida, while late peas and beans were being damaged at Booneville, Mississippi. Rains in North Carolina made control of the Mexican bean beetle difficult, and beans in numerous home gardens of Ashe County were destroyed completely.

Cabbage insects were also prominent among the fall vegetable pests. Cabbage loopers were destructive to several vegetables in Delaware. Cabbage and cauliflower carried heavy infestations in parts of Pennsylvania. In the Arlington, Wisconsin, area an average of 75 larvae per head was recorded. More than 100 acres of cabbage had been abandoned by early September due to the looper, and the state's entire crop was threatened. Michigan, North and South Carolina also reported heavy local infestations. In addition to the cabbage looper, the imported cabbageworm was reported infesting crops in Delaware, Pennsylvania, South Carolina and Wisconsin.

The pickleworm has been injurious in several states, and by early September was reported in Centre County, Pennsylvania. Serious damage to cucumbers, squash and cantaloupes was reported in Marshall

County, Mississippi. In some squash fields in the Clarksville, Tennessee, area, losses approached 100 percent. Infestation of cantaloupes at Experiment, Georgia, also neared the 100 percent figure. Other areas reporting damage from the pickleworm included Spartanburg, and Charleston Counties, South Carolina and Wake and Duplin Counties, North Carolina.

Hornworms were active on tomatoes and peppers in Delaware, and on seedling peppers in Hidalgo County, Texas. Hornworms caused very heavy damage to Maryland tobacco during August, and were responsible for some fields not being harvested. In South Carolina, controls were necessary to protect late tobacco, and a late brood was expected in North Carolina, where egg-laying was observed.

European corn borers were causing heavy damage to pimento pepper fields in Some Alabama counties. Of 35 fields examined in DeKalb, Marshall, Cullam and Blount Counties, 29 were found to be infested. Harvesting of peppers was stopped in Marshall County, where the greatest amount of borer damage was found.

Cotton Pest Damage

ALTHOUGH the cotton growing season was about over in most areas, by early September, several insects were still very much in the picture. Boll weevil infestations were on the increase in Oklahoma, and cotton continued to be damaged in the eastern third of Texas. Arkansas infestations remained high and continued to increase on young cotton. The build-up continued in southwest Tennessee, and it was expected that a record population might go into hibernation in Mississippi. Louisana infestations continued to increase, and all fields checked in Georgia and Alabama were found infested. South Carolina reported an increase of weevils on the top cotton crop in the Piedmont region, and migration was under way in North Carolina. Missouri is alone in reporting fewer boll weevils than it had in the past two or three years.

Bollworms on cotton have been heavy in widespread areas. Heavy infestations were reported from eastern Riverside County, California, and on the increase in the San Joaquin Valley, although generally light. In Arizona, bollworms were the principal pests of cotton. The insect was on the increase in the other cotton producing states and, with the egg being deposited, if damage was not already occurring, at least some was expected. Examinations for the pink bollworm showed heavy infestations in the coastal bend counties and along the Brazos River of Texas. The coastal bend counties showed very heavy increase in number of pink bollworms per bushel of trash examined compared with 1954; 827 against 42 last year. This increase is believed due to reduction of acreage in the drought stricken counties.

Other Insect Notes

THE yellow clover aphid was on the increase in alfalfa in early September, in areas of California, Arizona, New Mexico and Kansas. Heaviest infestations in Nebraska were in Republican River Valley. Utah and Oklahoma reported severe damage in a few counties. Other cereal and forage insect activity of particular interest during the period included unusual abundance of European corn borer in Wisconsin and abundance of corn rootworm, plant bugs, fall armyworm and alfalfa caterpillar in some other states. The more important fruit insects during the period were mites in New Mexico, Colorado and Minnesota. These pests were on the increase in the Orleans, Indiana, area. In the Vincennes area of that state, *Tetranychus* species increase occurred about 60 days later than in 1954. European red mite injury in northern Indiana was more severe on all fruits than in 1954. In southern Illinois, populations were on the increase, but little injury noted. At Shelby, Michigan, peaches and plums were being damaged. Oriental fruit moth caused heavy damage to late peaches in central Pennsylvania and red-banded leaf roller injury to this crop was unusually prevalent in Ohio.★★

Eastern ESA Meet Nov. 21

The annual meeting of the eastern branch of the Entomological Society of America is scheduled to be held at the Lord Batlimore Hotel, Baltimore, Md., on November 21-22.

The 1956 meeting is tentatively scheduled for Philadelphia or Atlantic City. Members will vote on the 1956 meeting place at the Baltimore conference.

•

USDA Report on Stored Seed

High moisture content and high temperature speed up the life processes of seed and unduly shorten the period of viability. These conditions also favor the rapid development of insect pests. To preserve seed and protect it from insect attack during storage, it should be kept cool and dry.

Seed may become infested by insects in the field. However, most infestation results from storage in bins that have not been thoroughly cleaned or that are near sources of infestation. Prompt harvest, followed by drying if necessary, and storage in clean, insect-free, weatherproof premises is essential. Bins and warehouses should be thoroughly cleaned and sprayed with a residual spray before being used. DDT, TDE, methoxychlor, pyrethrum, or allethrin all make effective sprays.

Silica dusts, magnesium oxide, pyrethrum dusts, and DDT mixed with seed afford effective and lasting protection from insect attack under appropriate conditions. Seed treated with DDT dusts should not be used as food for man or livestock. Pyrethrum sprays are effective in protecting seed.

Storage of seed at temperatures below 60° F. will prevent serious insect injury, and heating of dry seed to 140° F. for 10 minutes destroys insect infestations.

Moth infestation in warehouses can be controlled by periodic application of pyrethrum space sprays or aerosols. Insect resistant bags give worthwhile protection from infestation. *USDA Bulletin AMS-64.* "Protecting Stored Seed from Attack."

WASHINGTON Report

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

THE high cost of readying pesticides for market has now been given a further boost by an increase in fees for the establishment of tolerances set by the Food and Drug Administration. Whereas the basic fee for filing for a single numerical tolerance was $500, the new fee effective October 17 will be $1,000. The basic fee applying for two or more numerical tolerances was $750 and is to be $1500. Other fees will also be doubled on the effective date.

Food and Drug officials frankly state that the fees which were made a part of the original Miller Amendment were set after consultation with industry on the basis of the best available estimates. In the first year of operation under the Miller Amendment, about 40 petitions have been filed. Food and Drug cost accountants have come in the front office with a flock of paper covered with red ink. Since the law stipulates that the Food and Drug Administration must charge fees to cover certain parts of their services to the agricultural chemicals industry, the Commissioner, George P. Larrick, has no alternative but to up the ante for his "customers."

The Commissioner and his staff are busy with a host of other problems, including the decision on "Aramite" and tolerances for grain.

As of July 1, 1956, the Commissioner is ruling that tolerances for filth in wheat will be more strict — one rodent pellet per pint and one percent insect-damaged kernels. These new tolerances are to apply beginning next July to coincide with the new harvest and to give those concerned time to prepare for the stricter regulations. Even so, these tolerances are very lenient. In the opinion of some officials—the Administration is simply lowering permitted tolerance levels as fast as practicable. Up until now, most of the reliance on compliance has been placed on an extensive educational campaign which is expected to reach a peak between now and next July.

Of the 3,755 carloads of grain examined by Food and Drug inspectors, 29 contained excessive rodent filth under the present standards, and 3 cars were in violation on the basis of insect contamination. Thus the Administration feels there is still a considerable way to go in further clean-up to establish compliance with the new regulations.

However, Commissioner Larrick feels that "definite progress is being made and that through further cooperation among all interested parties, the nation's food grain supply should meet higher and higher standards."

* * *

The two big targets upon which attention was centered during the Spring Lake meeting of the National Agricultural Chemicals Association were market development and public relations. It seems clear that members are anxious for positive aggressive programs to be developed to produce measurable results in both fields.

W. W. Allen, NAC president and manager of agricultural chemical sales for the Dow Chemical Company, cited the NAC herbicide program as exemplifying an activity where most of the money is being devoted to promotion. Mr. Allen stated that about 90% of the funds are used for promotion; only about 10% of the money is used for defensive activity. His address set the tone for the three-day meeting which followed. He called for more, not less, effort on the part of industry to develop programs of mutual interest.

Lea S. Hitchner, executive secretary of NAC, listed five principal areas where he believes the Association can be effective in building markets for member companies. These fields are:

Plant Diseases
Stored Grain
Herbicides
Forest Insects
Soil Insects.

While much attention was directed toward building new markets, strong interest was evident in the legislative field as well, judging by the large attendance and spirited questioning during the Friday session devoted to the Miller Amendment.

* * *

It seems appropriate that following this mention of the Miller Amendment, I take this opportunity to bring the good news that Joseph A. Noone, NAC Technical Adviser, is back at work in the Association's Washington office. Joe has spent a lot of time and hard work on the Miller Amendment.

* * *

Congratulations were indeed earned by M. R. Budd, chairman of the convention Program Committee, for building an informative, interesting program. It ranged all the way from a pair of dry Martinis to economic trends and other matters of primary interest to Wall Street. The pair of dry Martinis were drawn by Professor G. E. Lehker, Purdue University, during his "cartoon talk" showing what insects are and the problems they pose to humans. Lehker's talk drew loud applause and provided a wel-

come laugh in what were otherwise rather serious deliberations.

Lest you still wonder about the pair of dry Martinis, they were actually the two wheels of an automobile with the olive forming the hub. The entire industry is indebted to E. Green, Monsanto Chemical Company, St. Louis, for his penetrating analysis of the Professor's drawing, which, according to the Purdue scientist, is the first time such identification has been made in all the 19 years he has been presenting his "cartoon talks."

* * *

NAC's Foreign Trade Committee, chairmaned by James M. Merritt, Diamond Alkali Company, is reported to have had a stimulating meeting, with increasing interest among members, and prospects for increasing foreign trade for agricultural chemicals and in developing more efficient avenues of servicing these markets. The Committee is planning future meetings and it seems likely there will be a step-up in the general activity.

One of the matters discussed by the Committee, and in some detail by Peter E. Joyce, Shell Chemical Corporation, was a development in Central and South America through auspices of the International Cooperation Administration to provide greater opportunity for two types of agricultural training which may have a bearing on future industry markets. The one type of educational opportunity is agricultural editor — type training which should ultimately result in more practical agricultural information reaching more farmers in South American countries. The other is a step-up in educational opportunities for county agent type training. These two programs could well increase the general level of farming skill. This could well expand the base of effective buying power and demand for the agricultural chemical industry's products.

* * *

One other evidence of a growing NAC program to meet the increasing needs of its members is the addition of Kimon T. Karabatsos to the staff. Mr. Karabatsos will be concerned with legislative and special services. Many members of the industry will remember. Mr. Karabatsos as the former Administrative Assistant to Congressman A. L. Miller (Republican, Nebraska). It was Mr. Karabatsos who handled much of the work, including correspondence and phone calls for industry members during the time when the Miller Bill was being considered by Congressional Committees and later by the full House and Senate. Mr. Karabatsos has newspaper experience gained largely in Nebraska before he joined Congressman Miller. He served as a Marine during the war, winning several decorations and citations for valor and outstanding performance.

* * *

Companies with products that apply to grassland agriculture may have new market opportunities offered when the Department of Agriculture finally decides on modifications in its program to meet present economic conditions. Whether it will be the "rented acre," or the "retired acre," or the "Land Bank," or "conserved area" is problematic, but in one way or another a stronger attempt is going to be made to get production in balance with demand. Part of the answer will be increased markets at home and abroad. The Secretary's recent trip overseas illustrated the Administration's determination to increase our exports and to meet "discount with discount" in order to get our share of international trade. The Administration has been under sharp criticism for permitting other nations to take away our markets. Specifically, world cotton production has been increasing while the United States cuts back its own acreage.

Various devices will be used to increase consumption of foods at home. The School Lunch Program and School Milk Program are two efforts in this direction along with increased merchandising and marketing agreements. However, rarely in the Twentieth Century peacetime history of the United States have supply and demand been in balance. Consequently, it seems logical to assume that with surpluses so menacing that they have caused Congress to up the borrowing authority of the Commodity Credit Corporation to 12 billion, something's got to give. That something is apt to result in more grassland.

The National Plant Food Institute appears to be progressing smoothly as plans develop on a broad front, including market development. Several films and publications are in production which will bear down on the value of fertilizer in the tight market situation in which many farmers now find themselves. Without doubt, the industry faces another big test this coming crop year.★★

MWSIC To Meet Oct. 27

Plans will be presented for expanded educational activities to help promote greater fertilizer use, at the Middle West Soil Improvement Committee's annual meeting Thursday, October 27, at the Sherman Hotel in Chicago.

More than 200 representatives of MWSIC's active and associate member companies are expected to attend, plus a number of specially invited guests.

Z. H. Beers, executive secretary, will summarize results of the committee's 1954-55 educational program in various media, including (1) newspaper publicity, radio scripts; (2) articles in farm magazines reaching national regional and state readership; (3) distribution of MWSIC color folders and film strips to vocational agriculture teachers in 2,000 schools in 13 states.

Beers will also describe results of the committee's grant-in-aid program sponsoring fertilizer research at Midwestern colleges and experiment stations. He will likewise report on field trips and contacts with colleges and stations.

The agenda will also include reports of the membership committee, headed by R. E. Bennett, of Farm Fertilizers, Inc., Omaha, Nebr.; the literature and film strip committee of which D. A. Williams, Minnesota Farm Bureau Service Co., St. Paul, Minn., is chairman; and the projects committee headed by K. W. Wagenseller, Swift & Company, Hammond, Ind.

Technical SECTION

Mixing Costs Cut By Effective Heat Utilization

The heat of formation of ammonium sulfate (from the reaction of sulfuric acid with excess ammonia in the normal mixing operation) is put to work to dry the mix in a new technique used at Super-Crop Plant Foods' new operation at Ottumwa, Iowa. The plant, designed by Fertilizer Engineering & Equipment Co., Green Bay, Wis., produces 10 tons per hour of mixed, ammoniated, granular fertilizer.

Significant advantages of the process, according to Super-Crop, are:

a) By reacting sulfuric acid with excess ammonia, sufficient heat is developed to remove some moisture from the mix. This heat is considered a process bonus. The cost of raw materials for forming ammonium sulfate directly in the mix is about the same as the cost involved in buying solid ammonium sulfate from coke-oven sources.

b) The plant is compact and all operations are done in a single rotary drum, 5 1/3 feet in diameter, 36 feet long.

Other important features of the production at the new plant are: a variety of high-nitrogen mixtures are produced; dissolved nitrogen is added as a solution to the solid components, allowing the use of an inexpensive form of nitrogen; and the finished mixture is in agglomerate or granular form, avoiding caking, dusting and segregation problems of powder-type mixtures.

The combination unit is supplied with a mixture of blended solids—usually superphosphate and potash—from a gravimetric feeder. Sulfuric acid (60° Be) and a solution of ammonia and ammonium nitrate in water are metered in through rotameters. Acid and ammoniating solution come in through adjacent nozzles; react at the nozzle outlets, which are placed along a 6-ft. long section of the unit.

Enough ammonia is added to react with the added acid and with the superphosphate. For every pound of acid 1.04 lb. of sulfate forms, and 4,000 btu are liberated.

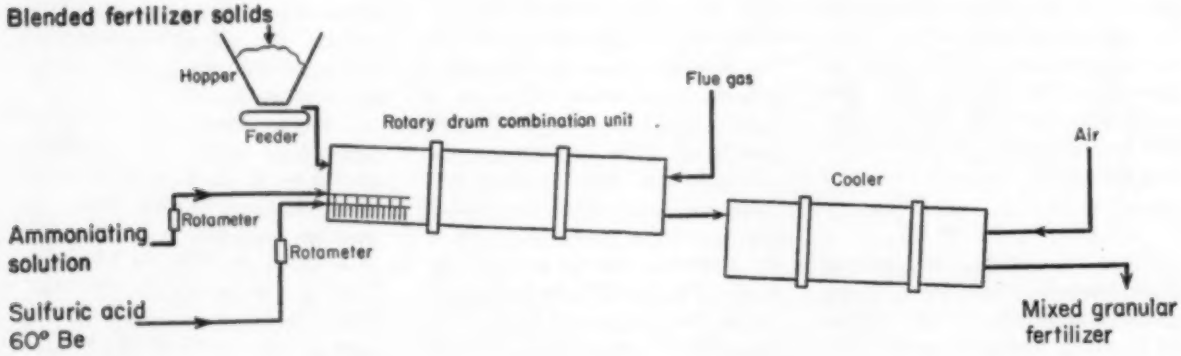
There are limits on how much ammonia and sulfuric can react. These include final composition and allowable working pressure in the combination unit.

Ammoniation takes place concurrently with sulfate formation. The purpose is to make the phosphorus more readily available for assimilation by crops. Calcium phosphates and ammonium sulfate are the important products of the reaction between ammonia and superphosphate. The presence of moisture and a temperature of about 200° F. aid what is actually a complicated series of reactions.

Moisture and a temperature of around 200° F. are also required in the next step—agglomeration—and this is one reason why ammoniation and agglomeration go hand-in-hand in the new mixing plants.

Agglomeration is an important operation wherein the small moistened particles assemble into larger, compacted particles by the cementing action of moisture and salts coming out of solution. This takes place in a 26-ft. long flighted section of the unit. Moisture content at this stage is about 10%—a sufficient quantity of liquid phase has to be present to distribute the solids.

For the large number of different formulations made at Ottumwa, additional heat is necessary to produce a dry product. Super-Crop uses



flue gas from an oil burner as a source of heat.

Cooling takes place in a separate unit—a 30-ft. long, 5 1/3-ft. dia. rotating drum, with air from a blower. The granules are then packed and shipped.

Heat and Reaction Cuts Processing Costs, *Chemical Engineering*, August, 1955.

•

Cathode Ray Kills Insects

Michigan State College, East Lansing, has just installed a G.E. electron beam generator (cathode ray machine) which can kill grain storage insects or make them sterile at a reported cost of about a cent and a half per ton for electric current.

It is reported that the machine may prevent mold on wheat, allowing storage of grain at higher moisture content. Bread treated with this machine can be kept at room temperature for many months without molding. It can increase the shelf life of beans and other products and can be used to change the chromosome arrangement in seed.

•

Vapam: New Weed Killer

Tests in Santa Barbara County, Calif., during the fall and winter of 1954-55 with Vapam, showed the new chemical to be effective as a weed killer in column stocks—*Matthiola incana*.

Vapam was applied with a hose proportioner at rates of ½, 1, and 1½ pounds per 100 square feet. 15 gallons of water were applied with the Vapam for each 100 square feet of soil. Another 30 gallons was applied to soak the material into the soil within 30 minutes of the initial watering.

The rate of 1½ pounds per 100 square feet was the only application that completely killed Bermuda grass. Complete kill may be obtained, however, at the lower dosages by spraying with an oil immediately before or after treating with the fumigant.

Both the 1-pound and 1½-pound rate proved effective in curbing cottony rot — *Sclerotinia sclerotierum*. New Soil Fumigant, Jack L. Bivins and Anton M. Kofranek, *California Agriculture*, September, 1955.

Color Coating Seeds

Germain's, Inc., Los Angeles, is currently using a process called Kolorcoating to tint flower and vegetable seeds for simple handling and sure identification. This unusual use of agricultural chemicals does not run into high tonnage despite the 25,000 pounds of seed clay-coated in recent months.

The process is an extension of a seed-coating process called Filcoating. Based primarily on clay (montmorillonite), the coating also contains Krilium (Monsanto) to aerate the mix. The seed is lightly moistened, then sprinkled with the clay in a large rotating mixer. Successive dampenings and clay applications are made until the desired number of layers is built up.

The coating makes it easy for flower seed users to identify the color of a flower's bloom and makes seeds big enough to handle. *Chemical Week*, June 11, 1955.

•

Seed Treatment of Oats

Five chemical seed protectants were used in tests with oats conducted during the past two years at substations of the Alabama Polytechnic Institute Agricultural Experiment Station.

Agrox, Ceresan M seed disinfectant, Orthocide 75, Panogen and Vancide 51 were applied to oat seed at the rate recommended by the manufacturer, and the oats were seeded at the rate of two bushels per acre.

Ceresan M proved to be the most effective in the field tests, as it was in the greenhouse and laboratory tests. Chemicals like Ceresan M give off fumes that penetrate the hulls of oat seed and kill the underlying organisms. Treatment of seed with chemical protectants results in increased field stands of oats in two ways: the chemicals kill seed-borne diseases, and they protect the seed, during germination, from soil-infesting disease organisms.

Seed Treatment Protects Seedling Oats Against Disease and Results in Better Stands, J. A. Lyle, Department of Botany and Plant Pathology, Alabama Polytechnic Institute, *Highlights of Agricultural Research*, Vol. 2, No. 2, API Agricultural Experiment Station.

•

Insecticides for Corn Borer

Granular-type insecticides have shown promise for controlling the European corn borer in cooperative USDA-State experiments at Ankeny, Iowa. Results of 2-year tests by scientists of the USDA and the Iowa Agricultural Experiment Station indicate that DDT, EPN, and heptachlor used in granular form give as good, or possibly better, borer control than when used in conventional emulsion sprays. Furthermore, they leave much less insecticide residue on the corn.

Thus, granular insecticides may be the answer to the residue problem facing farmers who graze livestock in their cornfields after harvest or put up the stalks and leaves as silage. Toxic residues from insecticide-treated corn may accumulate in the body fat of livestock or be found in the milk of dairy cows when the animals are fed on the treated plants.

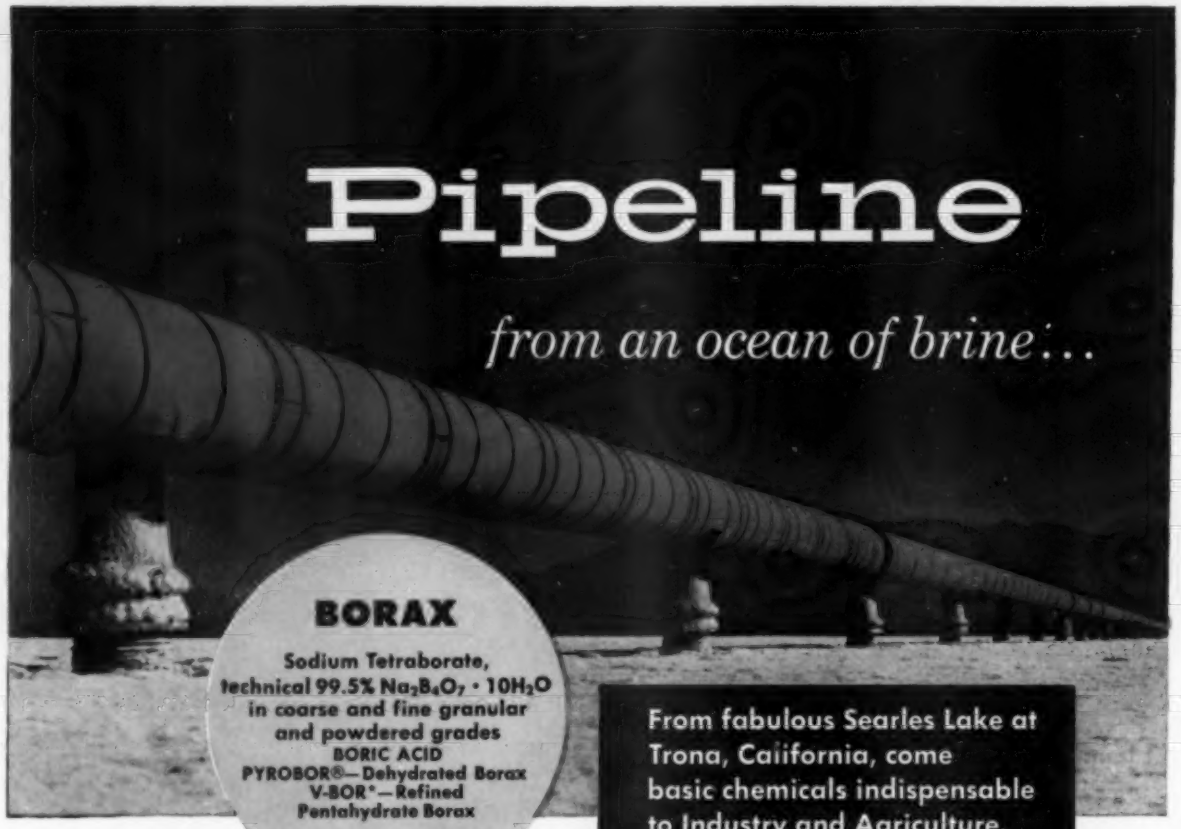
The Ankeny experiments show that applications of the new, granular insecticides leave 100 to 200 times less residue on the leaves of corn plants than emulsion sprays, and about half as much residue where the leaves join the stalks. Unlike sprayed materials, the granular toxicants do not cling to leaf surfaces, but tend to slide down into the leaf whorls and to the junctures of leaf and stalk.

•

Control of Potato Flea Beetles

Dr. James B. Kring, entomologist at The Connecticut Agricultural Experiment Station, reports in a station circular on his study of the potato flea-beetle problem at Windsor, Windsorville, and Mt. Carmel.

In brief, he found that several other insecticides, alone or in combination, gave effective control of potato flea beetles where DDT was no longer effective. DDT at double the previously effective concentration gave unsatisfactory control in two of the three areas. Dieldrin alone or combined with chlordane gave the best protection. A detailed report of the materials and results in the 1953-54 tests is given in the circular.



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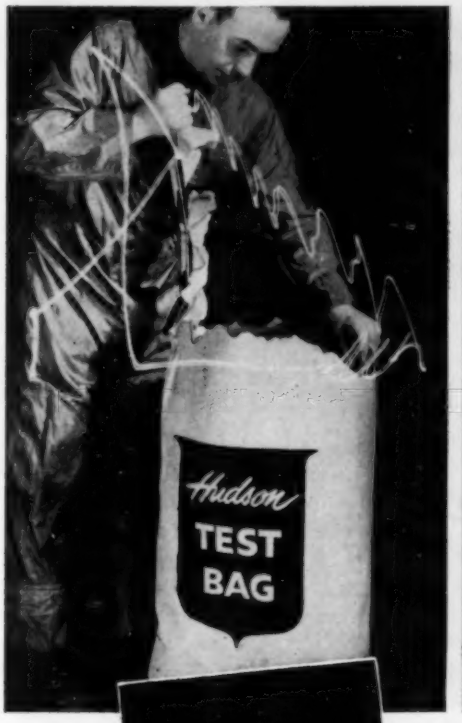




Photo left: Actual light tracing photo shows how knife blade or pull and tug method of opening wastes time and product.

Photo right: Snap motion opening – saves time and product.

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Defoliants for Dry Beans

Cornell University has added Shed-A-Leaf, potassium cyanate and Magron to the list of defoliants for dry beans in 1955. Endothal, which was recommended in 1954, has been removed from the approved list of defoliants pending clearance indicating that no harmful residue will be found on foliage or beans.

Beans sprayed with defoliants dry while standing equally as fast as pulled beans during periods of good drying conditions, and more rapidly during rainy weather.

Shed-A-Leaf and Magron, at the lower rates of application, are defoliants which cause the leaves to fall gradually. Potassium cyanate and higher rates of Shed-A-Leaf and Magron act as desiccants to dry leaves. A row crop sprayer, three nozzles per row, has given excellent coverage. Airplane application was effective in 1954. *Cornell Veg-News*, Vol. 6, No. 3, Sept. 1, 1955.

•

Respirator Devices

The U.S.D.A. has approved various devices for protection against inhalation hazards of dusts, mists, and low vapor concentrations of certain insecticides. The following commercially available respirators have been tested and found to give adequate protection against dusts, mists, and low vapor concentrations of aldrin, dieldrin, endrin, chlordane, EPN, parathion, and nicotine, but *not* against TEPP and demeton vapors:

Respirator No. 5055, equipped with R-55 filter and cartridge unit. Two units attached to facepiece. (American Optical Co., Southbridge, Mass.)

Healthguard Respirator style 95, equipped with Code B cartridge and filter 1000 or 1001. One unit attached to facepiece. (Chicago Eye Shield Co., Chicago.)

Farm Spray Respirator, equipped with cartridge No. CR-49293 and filter No. 49294. Two units attached to facepiece. (Mine Safety Appliances Co., Pittsburgh.)

DC 5011 Aluminum Body Respirator, equipped with DMA cartridge and P-7 filter. (Pulmosan Supply Equipment Corp., Brooklyn.)

Agrisol Dust and Vapor Respirator, equipped with R-414 filter and 11-A Agrisol cartridge. (Willson Products, Inc., Reading, Pa.)

Respirators listed below will give adequate protection against TEPP and demeton vapors as well as parathion, aldrin, dieldrin, endrin, chlordane, EPN, and nicotine. All of the respirators have two cartridge units attached to the facepiece.

Respirator No. 5561, equipped with filter cartridge combination R-561. (American Optical Co., Southbridge, Mass.)

Farm Spray Respirator No. CR-72183, equipped with cartridge No. CR-49293 and filter No. 73488. (Mine Safety Appliances Co., Pittsburgh.)

All Vision Chemical Cartridge Respirator No. CR-74910, equipped with inner cartridge No. CR-73841 and outer cartridge No. 73927. (Mine Safety Applicances Co., Pittsburgh.)

Agritox Respirator, equipped with cartridge No. 11A and filter No. R-490. (Willson Products Inc., Reading, Pa.)

•

Nuclear Energy Delays Sprouts

The common potato, exposed to radiation, can be stored for at least 18 months without sprouting and it is possible that further research will determine that the storage life of many other foods can be similarly prolonged. This was the prognostication of Stamford Research Institute in a recent news bulletin. Large amounts of radiation at high intensities are being studied to accomplish useful results in chemical processing, in improvement of plastic materials, and in sterilization, pasteurization and deinfestation of agricultural products.

The widespread educational process in nuclear energy going on within industry began with the passage by Congress of the Atomic Energy Act of 1954 which removed many of the restraints on general dissemination of technical information.

USDA Tests MOPA Properties

Dr. John W. Mitchell and coworkers of USDA's Agricultural Research Service have made extensive tests of MOPA (alpha methoxy phenyl acetic acid) and other potential plant systemics. Their experiments show that MOPA applied to plant leaves or stems is absorbed and translocated both upward and downward inside the plant. With the help of soil moisture, this chemical can even move from the roots of a treated plant into those of an adjacent untreated plant in the soil. MOPA is a growth-regulating chemical, first compounded by Dr. Wilkins Reeve of U. of Md.

Dr. Mitchell and his associates at the U. S. Plant Industry Station, Beltsville, Md., believe that the great mobility of MOPA within plants is probably due to the chemical's basic physical makeup, or molecular structure. They have found another substance, chemically related to MOPA, which also moves readily through plants, though not from the roots of one plant to another. This second chemical is mandelic acid. Unlike MOPA, however, mandelic acid has no visible growth modifying effect.

•

New Antibiotic Controls Fungus

A new antibiotic with a promising future in the farmer's fight against plant disease is "Filipin," a discovery of plant pathologists and chemists of the University of Illinois and the Upjohn Co., Kalamazoo, Mich.

Drugs such as streptomycin and Terramycin made the headlines because of their successes against bacterial diseases. Filipin goes after some of the fungus diseases. As a spray, Filipin reduced tomato infection with grey leafspot by 25 percent below infection in untreated tomatoes.

Tomato and pea seeds soaked in filipin germinated normally, proving that antibiotic to be relatively nontoxic to plants. As a sidelight, this germination test also pointed up the fungicidal ability of this new antibiotic: about 1 percent of the filipin-soaked pea seeds developed fungus decays; 12 percent of the "control" seeds, which were germinated in distilled water, decayed.

INDUSTRY *Patents*

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received outside of the United States the cost will be $1.00 per copy.

2,709,648. HERBICIDAL COMPOSITION AND METHOD EMPLOYING MIXTURES OF A POLYCHOROPHENOXY COMPOUND WITH A PHENYL DIMETHYL UREA. Patent issued May 31, 1955 to Truman C. Ryker, Wilmington, and Dale E. Wolf, Hockessin, Del., assignors to E. I. du Pont de Nemours & Co., Wilmington, Del., a corporation of Delaware. A herbicidal composition containing, in admixture with a herbicidally active polychlorophenoxy compound selected from the group consisting of pentachlorophenates, 2,4,5-trichlorophenoxyacetic acid, its salts, esters and amides, and 2,4-dichlorophenoxyacetic acid, its salts, esters and amides, a herbicidally active phenyl dimethyl urea compound selected from the group consisting of 1-p-chlorophenyl-3,3-dimethylurea, 1-phenyl-3,3-dimethylurea, and 1-(3,4-dichlorophenyl)-3,3-dimethylurea, said herbicidal composition containing said admixture of said herbicidal compounds in a herbicidal concentration; and wherein said herbicidal compounds in said admixture are mutually activating and produce a synergistic herbicidal effect.

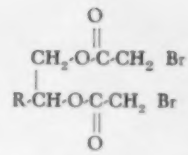
2,709,649. PROCESS FOR PRODUCING PHOSPHATE MATERIAL. Patent issued May 31, 1955 to Ira M. Le Baron, Lakeland, Fla., assignor to International Minerals & Chemical Corp., a corporation of New York. A process of recovering available phosphatic material which comprises admixing ground phosphate rock particles between about 48% and about 80% of which will pass through a 200 mesh standard screen with aqueous sulfuric acid of a strength in the range of approximately 50% to approximately 70% sulfuric acid, leaching the soluble phosphate constituents from the acid mix, separating undissolved solids from the solution of dissolved phosphatic solids, segregating the undissolved solids into portions, one of which contains particles of a class smaller than 150 to 250 mesh and the other portion of which contains particles larger than 150 to 250 mesh, subjecting the portion containing particles larger than 150 to 250 mesh to the action of strong sulfuric acid, incorporating the strong acid and dissolved solid matter into an acid mix of untreated rock and sulfuric acid processed in the initial step, and recovering the dissolved phosphatic solids from the solution of dissolved phosphatic solids leached from acid mix.

2,710,823. FUNGICIDAL COMPOUNDS. Patent issued May 31, 1955 to Leon Katz, Springfield, N. J., assignor to Schenley Industries, Inc., New York, a corporation of Delaware. A compound of the group consisting of benzoxazole 2-hydrazones of aldehydes and ketones, containing a radical of the group consisting of hydrogen and lower alkyl, and a substituent radical of the group consisting of 2-hydroxyl, 4-carboxy, 4-carboxy-methoxy (—OCH_2-COOH), 4-di (lower alkyl) amino and 4-chloro.

2,710,824. FUNGICIDAL COMPOUNDS. Patent issued May 31, 1955 to Leon Katz, assignor to Schenley Industries, Inc., New York, a corporation of Delaware. A compound of the group consisting of benzoxazole 2-hydrazones of aldehydes and ketones, containing a radical of the group consisting of hydrogen and lower alkyl: a radical of the group consisting of hydrogen, hydroxyl, and di-(lower alkyl) amino: and a radical of the group consisting of hydrogen and lower alkyl.

2,711,367. WEED KILLER CONTAINING BORAX. Patent issued June 21, 1955 to Clifford A. Parsh, Sr., Kansas City, Mo. A herbicidal composition comprising a slurry produced by admixing from ¼ to two pounds of aluminum sulphate; from one to five gallons of water.

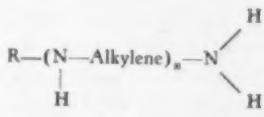
2,711,949. METHOD AND COMPOSITION FOR THE CONTROL OF PLANT GROWTH. Patent issued June 28, 1955 to Keith C. Barrons, Midland, Mich., assignor to the Dow Chemical Co., Midland, Mich., a corporation of Delaware. A method for the control of plant growth which comprises applying to the plant foliage a phytotoxic amount of glycol bis(monobromacetate) of the formula:



wherein R represents a member of the group consisting of hydrogen and methyl radical.

2,711,987. INSECT TOXICANT REACTION PRODUCT OF HYDROXYAROMATIC AND ALKALI ORTHOSILICATE COMPOUNDS. Patent issued June 28, 1955 to Frank H. Lyons, Memphis, Tenn., assignor to E. L. Bruce Co., Memphis, Tenn., a corporation of Delaware. An insect toxicant composition comprising an aqueous solution of the reaction product of hydrated sodium orthosilicate with a member selected from the group consisting of beta naphthol, phenol, a halogen substituted phenol, cresol, a halogen substituted cresol, anthrols, and hydroxy substituted phenols, the hydrated sodium orthosilicate and said member being reacted in the ratio of from 1 mol of hydrated sodium orthosilicate to from 1 to 3 mols of said member.

2,712,544. CHELATING AGENTS. Patent issued July 5, 1955 to Frederick C. Bersworth, Verona, N. J., assignor to The Dow Chemical Co., Midland, Mich., a corporation of Delaware. Epoxide compounds conforming to the following formula:



wherein R is an alkyl group containing two carbon atoms to about 20 carbon atoms and has attached on two adjacent carbon atoms an oxygen atom

wherein Alkylene is a low molecular weight alkylene group which places two to three carbon atoms in the chain between the nitrogen atoms, and wherein n is an integer having a value of one to about four, and wherein at least one amino hydrogen is displaced by an acetic acid group (—CH_2COOM) and M is selected from the group consisting of hydrogen, ammonium bases and alkali metals.

2,713,535. HERBICIDAL COMPOSITIONS. Patent issued July 19, 1955 to Tracy M. Patrick, Jr., Melrose, Mass., assignor to Monsanto Chemical Co., St. Louis. A herbicidal composition comprising an oil-in-water emulsion of hexachlorobutadiene, said hexachlorobutadiene being present in the emulsion in a quantity which is toxic to plant life.

INDUSTRY TRADEMARKS

Appear on Page 94

INDUSTRY *News*

Byron Webster Retires

Chipman Chemical Co., Inc., Bound Brook, N.J., announced recently the resignation of Byron P. Webster as vice-president. His resignation is due to poor health. Mr. Webster has been with the company for thirty-four years. He will continue to act as a consultant.

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Aramite Tolerence Extended

A further extension to October 1 was recently granted by the U.S. Food and Drug Administration for Aramite, miticide manufactured by the Naugatuck Division of U.S. Rubber Co., Naugatuck, Conn. The extension makes continued use of Aramite permissible through October 1 in spite of the fact that no tolerance has as yet been set by Food and Drug on residues remaining on foodstuffs following application of Aramite. The company had requested a residue tolerance of 1 part per million, but action on the request has been delayed by FDA pending filing of a report by a five-man committee of scientists who are reviewing the case. It is anticipated that the report of the committee may be received prior to October 1.

The tolerance provisions of the Miller law were previously to have been made applicable to Aramite on August 5, but this date was subsequently extended to September 13. This further extension to October 1 allows a further period of grace which is evidently calculated to extend until the report of the scientific committee has been received and acted upon.

(See *Agricultural Chemicals*, September issue, pages 34-35, for further details.)

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Bridger Joins Davison Chemical

Dr. G. L. Bridger, consultant on fertilizer production and head of the department of chemical and mining engineering of Iowa State College, has joined the Davison Chemical Co. Division of W. R. Grace & Co. as director of agricultural research. Vincent Sauchelli, agricultural authority of long association with Davison, has been named chief agronomist of the company.

Chemagro to Mfg. Bayer 17147

Bayer 17147, a systemic insecticide by Farbenfabriken Bayer Co. of Germany, has been tested on experimental plots at Natchitoches, La., under the direction of Dr. D. Newsom of the Louisiana Agricultural Experiment Station. The organic phosphate has shown very promising results in the control of boll weevils and other cotton insects. It is expected it will be recommended for commerical pest control on cotton.

Chemagro Corp., New York, will manufacture Bayer 17147 for commercial use next year.

Carolinas-Virginia Pesticide Formulators Meet Oct. 3-5

The second meeting of the Carolinas-Virginia Pesticide Formulators Association is scheduled for October 3-5 at Holly Inn, Pinehurst, N.C. An address by J. M. Grayson will open the 3-day conference, following which reports will be given by Glenn C. Klingman, North Carolina State College, and J. H. Cochran, Clemson College.

1955 officers of the new Association are: president, W. R. Peele, W. R. Peele Co., Raleigh; vice-president, W. P. Crown, Carolina Chemicals, Inc., W. Columbia, S.C.; vice-president, J. M. Maxwell, Maxwell Insecticide Co., Raleigh, N.C.; and secretary and treasurer, J. B. Maddrey, Planters Chemical Corp., Norfolk, Va.

W. Pickett, Farmers Cooperative Exchange, Statesville, N. C.; J. M. Maxwell, Maxwell Insecticide Co., Raleigh, 2nd v-pres.; W. P. Crown, Carolina Chemicals, W. Columbia, S. C., 1st v.-p.; W. R. Peele, Raleigh, N. C., president; G. Simches, Planters Chemical Corp., Norfolk; R. A. Tiller, Southern Agric. Chemicals, Kingstree, S. C.; John Daly, Daly Herring Co., Kingston, N. C.



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Cotton Conf. in Texas

High quality and low production costs—both essential to cotton in meeting its competition—provided the theme for the ninth annual Beltwide Cotton Mechanization Conference held Sept. 7-9 at Texas A & M, College Station, Tex.

The National Cotton Council sponsored the conference in cooperation with the Texas A. & M. College System, United States Department of Agriculture, Farm Equipment Institute, and Cotton Belt land grant colleges. Some 500 persons attended the three-day meeting.

Dr. M. T. Harrington, chancellor, Texas A. & M. College System, welcomed the visitors at the opening session at which Claude L. Welch, Memphis, director of the production and marketing division, National Cotton Council, outlined the role of mechanization in cotton's fight for markets.

Ervin L. Peterson, Assistant Secretary of Agriculture, Washington, discussed proposals for a long-range expansion of farm research and education. Other speakers reported how programs of the farm equipment industry, United States Department of Agriculture, and the land grant colleges are related to cotton's competitive future. Discussions on mechanical harvesting with the stripper-type machine were also reviewed.

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Borden Markets Fert. Cmpd.

The Borden Co., New York, announced recently that it has entered the chemical fertilizer field with a new nitrogen fertilizer compound called "Borden's 38". The product was developed by the chemical division of the Borden Co. and is based on a 38-0-0 formula. It is derived from urea formaldehyde, is reported to be "non burning" and to release nitrogen steadily for periods ranging from 6 months to a year.

The company advises that 15 to 18 pounds of the new fertilizer will provide nitrogen for a full season to 1,000 square feet of fine turfgrass. The product is available in 50 pound bags through wholesalers in the turf and ornamental fields and will be marketed in small packages for home use early next spring. Sales of the new product will be handled by A. G. Vojick.



Fluor Builds Plant at Selma, Mo.

Progress in the construction of the new $16,000,000 petro-chemical plant on the banks of the Mississippi River at Selma, Missouri, by the Fluor Corp. of Los Angeles, Calif., is shown in this aerial view.

The new plant of the Mississippi River Chemical Co., a division of Mississippi River Fuel Corp., for the production of nitrogen products is rising on schedule for completion early in October. Plant production is designed for 200 tons anhydrous ammonia a day. Other facilities include a 220-ton per day nitric acid unit, prilling plant, deep water wells, and storage facilities (not shown in photograph).

All the products of the new plant, ammonium nitrate fertilizer, nitrate solutions, and anhydrous ammonia for agricultural use will be marketed under the Mississippi River Chemical Company's "Steamboat Brand" trademark. They will be distributed through regular fertilizer manufacturing channels by Bradley and Baker.

Construction of the new plant was started last December. The plant will cover the southern portion of the 4,600 acre plant side and will employ some 150 people.

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NH_3 Plant for San Juan

Construction will begin shortly on a new anhydrous ammonia, sulfuric acid and ammonium sulfate plant at Guanica, Puerto Rico for Gonzales Chemical Industries, Inc., San Juan. The installation was designed and will be built by the Lummus Company, New York.

This will be Puerto Rico's first complete ammonia products plant, and represents the second largest new endeavor on the island. The plant will provide a source of ammonia-nitrogen and related products for fertilizer.

Forty-two thousand tons of anhydrous ammonia will be produced per year. Part will be sold as such, and the balance will be converted to aqueous ammonia, sulfuric acid, ammonium sulfate and possibly other materials for use by agriculture and industry.

This will make the fourth ammonia plant in two years for Lummus. The others include the Lion Oil installation at St. Charles Parish, Louisiana and The Westvaco unit at South Charleston, West Virginia.

New Agricultural Firm in Ohio

Growers Chemical Co., a subsidiary of Tiedjens Associates, Delaware, Ohio, have purchased Milan Brewing Co.'s buildings and equipment at Milan, Ohio, and plan to use these in formulating and distributing fertilizer solutions and other agricultural chemical products. The company is owned by V. A. Tiedjens, formerly chief chemist for the Nachurs and Berlow Manufacturing Co., Marion, Ohio. The plant is scheduled to be in operation early in October.

•

Calspray Ups Rembow, Hawk

California Spray Chemical Corp., Whittier, Calif., announced recently the appointment of Andrew J. Von Rembow as assistant to the district manager; they announced, too, the appointment of William R. Hawk of Suffolk, Va., as branch manager in the Virginia area.

Mr. Von Rembow has been with Calspray for 6 years. Prior to his appointment, he was a sales specialist at Richmond, Calif., working as an assistant under E. W. Cannon, vice-president and manager of marketing.

William R. Hawk has been with Calspray for 3 years as a sales representative.

Fertilizer Round Table, Oct. 11

The fifth annual Fertilizer Round Table, scheduled to be held at the Hotel Carlton, Washington, D. C., on Oct. 11-12th, will center its discussions on "Ammoniation" and "Granulation." Dr. Vincent Sauchelli, chief agronomist for the Davison Chemical Co., Baltimore, Md., has again organized the program and meeting, which will include the following discussion leaders and their topics:

E. C. Perrin, Allied Chemical & Dye Corp., will review the theories and practices of ammoniation. Ove Jensen, du Pont de Nemours & Co., will review developments in the production of granulated complete fertilizers, utilizing UAL solutions.

Temperature and moisture relationships in granulation, based on experiences of Eastern States Farmers Exchange, will be outlined by Rodger C. Smith, ESFE. A new process development in nitraphosphate manufacture will be discussed by A. J. Sackett, Jr., of A. J. Sackett & Sons.

A. Spillman, Fertilizer Manufacturing Cooperative, Inc., will review the main features of a new granulating installation. The Ammoniator-granulator installation at the Virginia Carolina Chemical Corp. plant will be described by E. J. Leister of Edward Renneburg & Sons Co.; while G. Halldorson, also of Renneburg, will discuss dryers and coolers in the ammoniation and granulation of fertilizers.

M. W. Thomas, Thos. Alabama Kaolin Co., will comment on the use of clay coatings to retard hygroscopicity in granulated ammoniated fertilizers; and J. O. Hardesty, U. S. Department of Agriculture, will give some of the fundamentals of the theory of granulation.

Comments in favor of standardization of screen sizes in the granulation process will be presented by W. King, W. S. Tyler Co.; and Dr. E. C. Kapusta, US Potash Co., will give some thoughts on the role of potash salts in the ammoniation and granulation of mixed fertilizers.

T. P. Hignett, Tennessee Valley Authority, will review the processes of granulation and ammoniation; and J. C. Sharp, Spencer Chemical Co., will tell of some of the work Spencer Chemical Co. is doing at the Ark Mo plant.

J. E. Iliff, Blaw Knox Co., will discuss the Swift Process of granulation.

Various topics of interest to the fertilizer industry will be discussed in a monthly column by Dr. Vincent Sauchelli, beginning with the November issue of AGRICULTURAL CHEMICALS.

Dr. Sauchelli needs no introduction to the agricultural chemicals industry, as he is well known in his own right as chief agronomist for Davison Chemical Co., Baltimore, author of several books and manuals on fertilizer manufacture, techniques, theory, etc.

AGRICULTURAL CHEMICALS is pleased to offer the comments of Dr. Sauchelli to its readers.

AAAS to Discuss Agriculture

Symposiums on "Southern Agriculture from 1913 to 1956" and "Atomic Energy and Agriculture," will be featured at the annual meeting of the American Association for the Advancement of Science, scheduled for Dec. 26-31 at the Municipal Auditorium in Atlanta, Ga. One section of the meeting will be co-sponsored by the American Phytopathological Society.

The symposium on Southern agriculture will include reports on: the contributions of the experiment stations; the concept of land management; and how the experiment stations reach the farmer.

The symposium on atomic energy will include discussion on soil-plant relationships; plant metabolism; animal metabolism; and food sterilization.

•

N. C. School Meets Jan. 10-11

The eight annual school covering herbicides, fungicides, insecticides, and rodenticides, will be held under the auspices of the North Carolina State College School of Agriculture and the college's Extention Division on January 10-11, 1956. The school will be held at the N. C. State College in Raleigh, N. C.

Mexico to Mfg. Insecticides

Production of synthetic organic insecticides has been proposed recently by J. Sperling of Foster D. Snell de Mexico. The plan includes the establishment of a private company, based on an agreement of prospective partners. The firm is still in the formative stages, and offers an open invitation to interested companies.

Mr. Sperling estimates that $5-6 million in investment capital will be required for the production of 6,000 tons of chlorine-based insecticides annually.

A copy of a preliminary report is available for review on loan from the Commercial Intelligence Division, Bureau of Foreign Commerce Intelligence Division, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington, D. C.

•

Canadian Entomologists Meet

At the annual meeting of the Entomological Society of Canada, October 18-20, in Fredericton, N.B., Canada, reports dealing with effect of pesticides on natural predators, role of pollinators in crops and ornamentals, and systematic entomology in Canada will be featured. Included too in the program are discussions on locust research and control, bumblebee ecology and the chemical physiology and toxicology of insects.

O. Fournier is president of the society which will hold its meetings at the Lord Beaverbrook Hotel.

•

N. C. Director Dies

Dr. Frank Jeter, director of agricultural information at North Carolina State College, Raleigh, N. C., died early in September of a cerebral hemorrhage. He was 64 years old.

•

Stauffer Merges Consolidated

Stauffer plans to merge Consolidated Chemical Industries, Inc., were announced recently, and are to be voted on by stockholders of both firms. Consolidated produces heavy chemicals and bone and hide products. Consolidated operations, under the plan, will continue as a division of Stauffer.



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Problems and Questions Relating to the Marketing of A Home-Garden Product Discussed at CMRA Conference

WITH the recent influx of manufacturers into the home garden market, considerable interest was expressed in a recent report by F. S. Washburn, American Cyanamid Co., New York, on "Marketing Lawn and Garden Cyanamid." Mr. Washburn addressed the Chemical Market Research Association on September 22nd, at its meeting in Virginia Beach, Va. The following are excerpts from his address:

"At the end of World War II when calcium cyanamide was no longer in heavy demand for the production of essential war materials more of it became available for agricultural use. With newer and cheaper forms of nitrogen available to the farmer we started investigating new outlets for Cyanamid. The rapid expansion of the home garden market over the last ten years stimulated by the nation's tremendous home building program led us to look into this sales possibility.

"We felt, after studying our research material, that we could recommend Cyanamid to the home owner for putting in a new lawn, for renovating an old one, for building humus in the soil by spading Cyanamid down with plant refuse and for the decomposition of organic matter in the compost pile *provided* we could teach him not to use it for other purposes.

"While we had the product and the recommendations we nevertheless were not experts in the marketing of garden items and decided to proceed cautiously for several reasons. The first was that Cyanamid itself is not an easy product to handle. It is no respecter of species. It will kill grass seed just as quickly as weed seeds, if direct contact is made at time of application.

"The average consumer's assumption that if one pound will do a good job, two pounds will do better, doesn't hold true of this material. We realized that if this should happen in establishing a new lawn, a seed bed prepared with too much Cyanamid could very well prevent the germination of expensive grass seed and result in dissatisfaction and complaints. We also recognized that other requirements such as even and uniform distribution, adequate soil moisture, and a waiting period of two to three weeks between treating and seeding, might not be met and would lead to difficulties.

"While home gardeners have been using fertilizer for many decades, they have been accustomed to just carelessly throwing it on the soil in the spring, either before or after planting. If they were to do the same with Cyanamid, which after all is basically a fertilizer, we were sure they would get into trouble. Learning facts by experience is not conducive to repeat sales. Many patient hours of discussion were spent in trying to arrive at a set of suggested recommendations that would be as foolproof as possible. Only then did we consider the packaging of the material. Originally we set out to sell a ten, twenty-five and eighty pound package but soon learned that the eighty pound package was much too heavy and cumbersome for the average gardener's wife to carry home. We have since replaced it with a fifty pound package. The ten pound package was considered an introductory size because it would not be possible to do much around the home garden with less than twenty-five pounds. If and when lawn and garden Cyanamid becomes well established, the ten pound package probably will be discontinued.

"While Cyanamid for building humus in the soil offered sales possibilities in both fall and spring, a late summer and fall recommendation limited the major turf sales period to a comparatively few weeks. This naturally posed inventory problems on both being able to have enough material on hand during the use period, and having carry-overs.

"Price-wise, we had the problem of suggesting a retail list that would offer the dealer and distributor sufficient inducement to overcome his objections to the storage and handling problems involved.

"When directions, a name and a price structure were settled upon we then faced the problem of where to sell it. Salesmen's investigations showed that wholesalers and dealers handling garden supplies were quite ready to accept this new product. There then remained only the question of how large an area we would introduce it in and what our advertising program should be.

"Certainly with the educational problem to be undertaken, this new product would not offer the prospect of immediate volume sales. It was not a mass consumer item and we could not be sure how many gardeners would understand and follow our instructions. All our original discussions led us to believe that it would take at least a five year program of practical experience in the sale and use of this product to really determine what our eventual tonnage could be. To undertake an actual market research test program with consumers would have been expensive and could too easily have been unfruitful. It would not have been possible to select a sufficient number of areas to find a reliable consumer purchase pattern. A spell of unusually hot weather or a prolonged rainy season, over the period of use, would make customers either unwilling or unable to use the material, and so give us a completely negative answer.

Such was the case in one small city where we secured saturation in both distribution and advertising only to find that a prolonged series of 95 degree weekends sent people to the beach rather than into their gardens. This small test campaign, however, did give us a clue to our best method of distribution. This was to try to keep the material in the hands of the better garden supply stores where the employees were intelligent enough, or had the time, to learn how Cyanamid should be used and so instruct

(*Continued on Page* 111)

GRANULATION

IS NOW POSSIBLE FOR ANY SIZE FERTILIZER PLANT

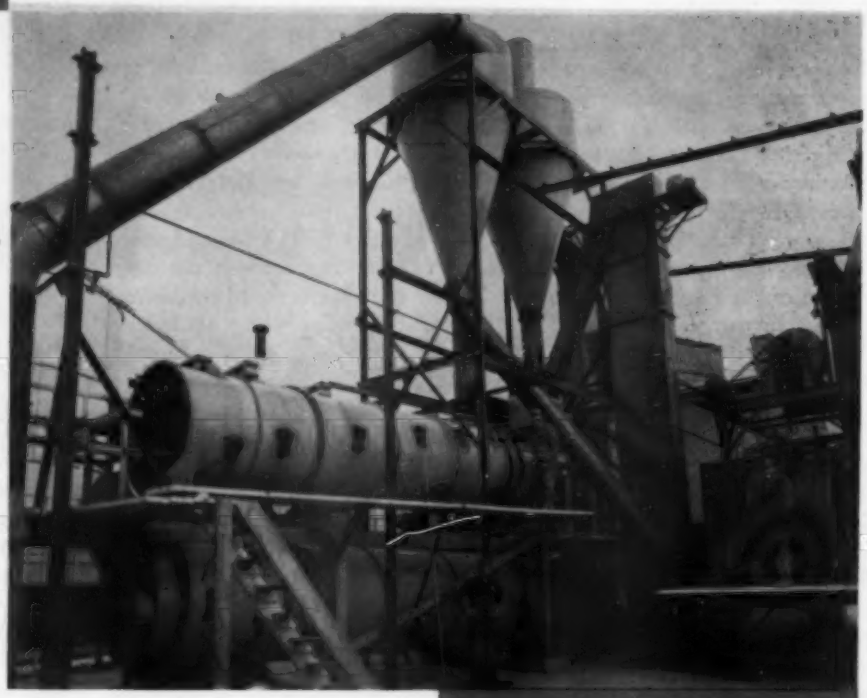
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INCREASES PRODUCTION

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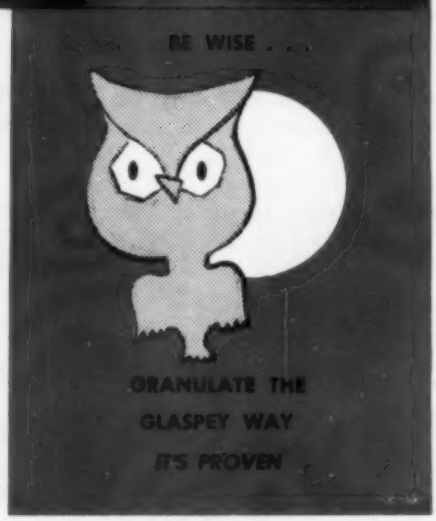
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Installation pictured above, Farm Chemical Co., Longmont, Colo.



CACA Oct. 13 in Quebec

The third annual meeting of the Canadian Agricultural Chemicals Association will be held October 13-14 at the Chantecler, Ste-Adele-en-haut, Quebec, Canada. A feature of the first day's session will be a panel discussion on "Chemical Control of Weeds and Brush in Canada." Participating in this review will be L. H. Shebeski, J. W. Suggitt, H. F. Stairs, H. W. Leggett, and J. J. Neilson, all of Canada. Arthur G. Pinard, Sherwin-Williams Co. of Canada, will discuss "Merchandising of Pest Control Products."

A highlight of the final day of the meeting will be a panel discussion on "Canadian Regulations on Administrative Tolerances for Insecticide Chemicals in or on Food." Participating in this discussion will be Lea S. Hitchner of the National Agricultural Chemicals Association, Washington, D.C.; C. A. Morrell, Canadian Food and Drug Divisions; and Charles H. Jefferson, Canadian Department of Agriculture.

The final session will include discussions on three new agricultural chemicals.

•

V-C Builds 3 Midwest Plants

Virginia - Carolina Chemical Corp. announced recently plans for the construction of three new fertilizer plants in the midwest. The plants, each designed for the production of high analysis V-C fertilizers, will be located at Orrville, Ohio; Remington, Indiana, and Estherville, Iowa. In making the announcement, the company said it plans to start construction immediately and expects each of the plants to be in production by next spring.

When the new facilities are completed, V-C will have thirty-nine fertilizer plants in operation throughout the nation.

•

Velsicol Changes Name

Velsicol Corp., formerly a Division of Arvey Corp., Chicago, announced that their corporate name has been changed to Velsicol Chemical Corp. At the same time, the company announced the following title changes for executive personnel: J. Regenstein, Sr.—from president to chairman of the board; J. Regenstein, Jr.—from vice-president to president; E. T. Collinsworth, Jr.—from vice-president and general manager to executive vice-president and general manager.

•

Ill. PCO Meet Jan. 30

The 20th annual meeting of the Illinois Pest Control Operators will be held at Purdue Univ., Lafayette, Ind., Jan. 30-Feb. 3, 1956. The North Central States Branch of the Entomological Society of America will meet at Purdue March 28-30.

Nopco Plans New Pilot Plant

Plans are being made by the Nopco Chemical Co. for the construction of a new pilot plant on its property in Harrison, N.J. The new structure, housing the latest in chemical equipment, will be devoted exclusively to developmental work and pilot production of new and improved products. The site selected is approximately 10,000 square feet, and is located on the Passaic River front. Although definite plans have not yet been drawn up, a multi-story building is envisaged. Nopco officials hope to have the building ready for occupancy early in 1956.

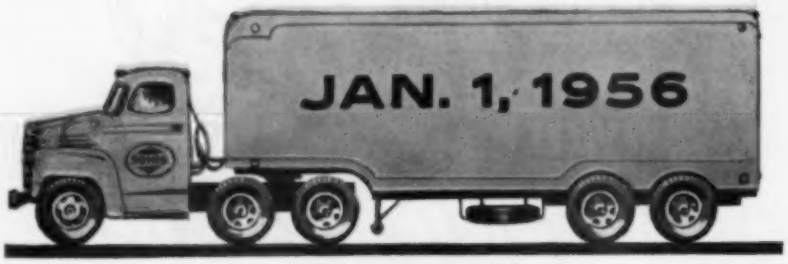


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NITRIC ACID
UREA-AMMONIA SOLUTIONS

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Emulsol Advances Execs

Solomen Epstein, executive vice president of Emulsol Chemical Corp., division of Witco Chemical Co., Chicago, was recently assigned the duties of general manager of the company.

Dr. Charles Fuchs, formerly chief chemist of Emulsol was elected vice president in charge of research and development.

•

CSC Producing Nitroparaffins

The world's first scale nitroparaffins production facilities are now in operation at Commercial Solvents Corp.'s Sterlington, Louisiana, plant. The first railroad tank car shipment of nitromethane flowing from the new facilities was made on September 7, 1955. It went to Peoria, Illinois.

Agriculture utilizes nitroparaffins in the manufacture of pesticides.

•

Antibiotics for Weed Control

University of Michigan scientists report good results in controlling weeds by a preemergence application of isoniazid. In very low concentrations the drug halted root growth of weeds. The drug is not used in commercial preparations for weed control, but the report suggests that a search of this group of chemicals may show an effective and economical weed killer.

•

V-C Net Off 33% in '55

Earnings of Virginia-Carolina Chemical Corp., Richmond, Va., in the fiscal year ending June 30, 1955, dropped 33% from the preceding year, due partly to a decline of sales to 77 million from 85 million. The company's annual report said that disposal of its former Black Leaf Division and a strike at the Florida phosphate mines accounted for about 40% of the decrease in sales.

•

TVA Contracts Renewed to '60

TVA announced early last month a five year extension of its fertilizer research and testing contracts with agricultural experiment stations in eight states. Included are the seven Tennessee Valley states of Alabama, Georgia, Mississippi, Tennessee, Virginia, North Carolina, and Kentucky, and the state of Washington. Contracts with the experiment stations have been in effect for the past several years and have been extended to June 30, 1960.

In addition to its contracts with Valley experiment stations TVA has contracts with four experiment stations representing major geographical areas.

The station in Pullman, Washington, tests TVA fertilizers under soil and climatic conditions prevailing in the northwest. The north central region is represented in the work at Iowa State College, at Ames, Iowa. The experiment station at Colorado Agricultural and Mechanical College, Fort Collins, Colorado, covers the western region. And the station at Cornell University, Ithaca, New York, represents the northeastern region.

In general the contracts provide for the testing of TVA fertilizer in laboratory, greenhouse, and field experiments to determine the efficiency of the products.

New NH_3 Plant Opened in Georgia by Southern Nitrogen Co.



(l to r) Messrs. Malcolm Smith, chairman of the board, John R. Riley, president, and George V. Taylor, vice president of Southern Nitrogen Co., which will start construction of a $14-000,000 petrochemical plant in Savannah, Georgia, this fall, examine a map of the plant site.

SOUTHERN Nitrogen Co. announced recently plans for the construction of a $14,000,000 petrochemical plant at Savannah, Ga. The plant is designed to produce 250 tons per day, which it will convert into nitrogen solutions for fertilizer use, and prilled ammonium nitrate. Construction of the plant will be started in the fall, and it is expected to be in operation before the end of 1956 . . . reports the new company.

Organizers of the company include John R. Riley, president, formerly vice-president in charge of sales and a director of Spencer Chemical Co.; Malcolm Smith, chairman of the board, formerly a director of Spencer Chemical Co.; and George V. Taylor, vice-president, formerly director of product sales for Spencer.

New Product for Chlorosis

An iron chelated compound containing "Orzan" is under development by Crown Zellerbach, Camas, Wash. The new compound, called "Greenz 26", has been field tested on pear, peach and prune trees in California, and is reported to offer protection against iron deficiency without producing foliage burn. Limited quantities will be available commercially in 1956.

•

OM Agronomist in Indiana

William F. Watkins, agriculturist with the Eastern Fertilizer Division of Olin Mathieson Chemical Corporation has been named agronomist for the Great Lakes sales district with headquarters at Lafayette, Indiana.

In his new position Mr. Watkins will provide advisory and research services on agronomy in connection with the sale of Olin Mathieson's Ammo-Phos high analysis fertilizers, pesticides, anhydrous ammonia and irrigation in the states of Ohio, Illinois, Michigan, Indiana, Wisconsin, and Kentucky.

Dow Reorganizes Ag Sales

A major reorganization of agricultural chemical sales was announced recently by Dow Chemical Co., Midland, Mich. Three new groups have been formed, according to W. W. Allen, departmental manager.

A "Farm Products" group with Glenn Gullikson as supervisor, will coordinate the work of product managers who are responsible for the sale of herbicides, insecticides, fungicides, and soil and grain fumigants.

An "Industrial Products" group, with Theodore L. Bendall as supervisor, will deal with Dow materials in the utility, industrial property, and commercial fields . . . including herbicides, grain fumigants and fertilizers.

A "Sales Planning, Development and Education" group, with Hillard L. Smith as supervisor, will have responsibilities which will include long range sales planning, and development of markets for new products.



Grace Names Pitner Mgr.

Dr. John B. Pitner has been named manager of Agricultural Service for Grace Chemical Co., according to W. J. Haude, vice president and general manager of the Memphis, Tenn., firm.

Pitner will be in charge of Grace Chemical's agricultural service program, including grant-in-aid research programs in various State Agricultural Experimental Stations, dealing with nitrogen fertilization of crops, and with protein nutrition of ruminant animals.

Prior to joining Grace, Dr. Pitner was head of the agronomy department at Clemson Agricultural College, Clemson, South Carolina, where he was in charge of research, teaching, and extension work.

•

St. Regis Buys Gen. Container

St. Regis Paper Co., New York, announces that it has acquired more than 95% of the outstanding capital stock of General Container Corp. of Cleveland, Ohio, as a result of an offer of exchange made by St. Regis and which was declared effective as of August 25, 1955. Under the terms of the offer, the holders of General's capital stock will receive 2-3/8 shares of St. Regis common for each share of General Container.

General Container, whose principal offices are in Cleveland, had sales in 1954 in excess of $23,000,000.

General is engaged in the manufacture of corrugated fibre shipping containers and allied products, folding cartons and set up boxes, and corrugating medium and container chipboard.

•

Campbell Joins Velsicol

C. E. Campbell, former director of research extension for the United Fruit Co., Boston, has been appointed technical representative for the Washington, D. C., area by Velsicol Chemical Corp., Chicago. Mr. Campbell has served on the research and extension staff at Cornell and with the R. T. Vanderbilt Company of New York in technical sales development of agricultural fungicides.

WACA Meets at Berkeley

At Hotel Claremont, Berkeley, California, October 11th, a meeting of the Western Agricultural Chemicals Association will feature three speakers. Dr. Rosmarie von Rümker, director of research, Chemagro Corp., on "Inter-Relations Between Basic and Applied Research in the Development of Modern Insecticides;" R. H. Rollins, assistant chief, Bureau of Chemistry, California Department of Agriculture, on "The Responsibilities of Pesticide Salesmen;" and E. D. Maloney, San Francisco Executive Assn., will discuss "Salesmanship and Sales Management."

C. Barnard, executive secretary, has announced that meetings of the directors and a membership business meeting will be held in the course of the day.

•

Symposium on Health Hazards

A session to consider the question of health hazards connected with the use of chemicals will be held December 29th during the annual meeting of the American Association for the Advancement of Science, to be held in Atlanta, Ga., at the Peabody Hotel. The symposium will be conducted under the co-sponsorship of the Committee on Toxicology of the American Medical Association.

The purpose of the session is to interpret new knowledge of chemical products to scientists in various fields, so they may in turn use and spread the information. The announcement of the meeting points out that the problem of health hazards has increased greatly in recent years, with the wider household use of chemicals formerly found only in industry. The committee is working toward more intelligent use of chemicals, so their advantages may be enjoyed without danger. Hazards connected with use of chemicals would be greatly reduced, they are confident, by wider understanding of the problems involved, reasonable care in use of toxic materials and careful attention to label instructions.

Bernard Conley, secretary of the A.M.A. Committee on Pesticides, will be moderator for the symposium. Participants will include: Lester M. Petrie, M.D., director, Preventable Diseases Service, Georgia Dept. of Public Health, Atlanta; Wayland J. Hayes, M.D., chief, Toxicology Section, Communicable Diseases Center, U. S. Public Health Service, Savannah; Irving Kerlan, M.D., associate medical director, U. S. Food & Drug Administration, Washington; and Mrs. Veronica Conley, assistant secretary, A.M.A. Committee on Cosmetics, Chicago.

Bonzer Heads Iowa Assn.

Bart Bonzer, Agricultural Service Co., Charles City, Ia., was elected president of the Iowa Agricultural Ammonia Distributors Association at a recent meeting in Des Moines. He succeeds B. A. Frankl.

Other officers are J. Jirovsky, first vice-president; H. Griener, second vice-president; C. E. Lakin, third vice-president; and R. J. Durbrow, secretary-treasurer. The association consists of some 90 distributors.

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Q. What do formulators and manufacturers require?

A. *Dependable* chemicals in *continuous* supply!

STAUFFER'S wide range of technical and formulated agricultural chemicals . . .

. . . coupled with *long* experience in *working with* manufacturers, formulators, packers, and growers . . .

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For the shelf life you need – there's a matched ATLOX® emulsifier

How much shelf life must your toxicant concentrate have—weeks, months, years? To get the margin of safety you need, be sure to choose the *right* emulsifier and use enough of it. Whatever your needs, there's a matched ATLOX emulsifier that will do the job economically.

When choosing an emulsifier, consider, also, the other characteristics of the concentrate and the way in which it will be used. We've listed the most important of these factors below. If you'll give us the data on your specific problem, we'll be glad to suggest an ATLOX emulsifier or blend that fills your needs.

EMULSION DATA CHECK LIST

1. Toxicant used _____
2. Solvent used _____
3. For water hardness _____ ppm.
4. Recommended dilution _____
5. Lbs. toxicant/gal. of concentrate _____
6. Desired emulsion stability _____
7. Shelf life expected _____
8. Ease of dispersion important? _____
9. Packaging: bulk _____ or small container _____
10. How is concentrate mixed and evaluated in laboratory tests? _____

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McGee at Ind. Health Conf.

"Farm chemicals have saved the cotton farmers alone, three-quarter billion dollars a year through control of insects," Dr. Lemuel C. McGee, director of Hercules Powder Co.'s Medical Department, told his audience at the Gulf Coast Eighth Annual Conference on Industrial Health in Houston, Tex., September 23rd.

Speaking on the topic "The Farmer and his Chemicals," Dr. McGee pointed out that no other chemical receives such rigid study before it is marketed, as does a new pesticide, and that information for effective and safe use is widely distributed through the cooperation of the press, radio, TV, and the Federal and State Extension services.

"An economic poison is required by law to bear warning statements when necessary to protect the public from injury. But it is easier to require sound labeling than it is to get the user to read and obey the labeling," he said.

•

Phillips Appoints Sales Execs.

L. L. Jaquier, Jr., and Robert S. McConnell have been named to positions in Phillips Petroleum company's fertilizer sales division offices at Bartlesville, Okla., where the company's headquarters are located.

Mr. Jaquier, formerly assistant manager of Phillips' Kansas City sales division, has been appointed manager of material sales for the fertilizer sales division. Mr. McConnell was assistant manager of Phillips' Wichita sales division until his new appointment as coordinator of fertilizer sales.

•

Naugatuck Markets Duraset

Naugatuck Chemical Division of U.S. Rubber Co., Newark, Del., recently marketed its new fruit-setting plant growth regulator, "Duraset." The material has been tested over the past three years at the Delaware Agricultural Experiment Station.

Tests at the experiment station indicated in one case that yields of baby lima beans were increased as much as 96 percent. In seven experiments, the average increase was 26%, or 474 lbs. of lima beans per acre.

Chemically, the new compound is N-metatolyl phthalamic acid. When applied during the pod-setting period of lima beans, it appeared to reduce excessive dropping of buds, flowers, and small pods when extended hot, dry weather or extended rainy weather prevailed during this period. In certain cases, this material has also aided fruit set of tomatoes as well as peppers, snap beans and cherries.

Ia. Firm Producing Liq. Fert.

The Farm Products Division facilities of the H. D. Campbell Co., a Rochelle, Illinois firm, in Strawberry Point, Iowa will be expanded. The company will install a liquid fertilizer plant in Strawberry, which will employ about 12 persons in the production of weed killers, insecticides, fertilizers and other agricultural chemicals.

The new plant is expected to be in production early in October.

HANDBOOK
of
INSECTICIDE
DUST DILUENTS
and
CARRIERS

Available Oct. 15

Revised Edition,
Edited and Prepared by

D. E. Weidhaas and
J. L. Brann, Jr.
Cornell University, Ithaca, N. Y.

250 Pages

$4.75 in USA $5.25 Elsewhere

THE original publication "Properties and Commercial Sources of Insecticide Dust Diluents and Carriers" prepared by T. C. Watkins and L. B. Norton of Cornell University has been brought up to date and completely revised by Drs. Weidhaas and Brann. The new edition contains commercial information as well as data obtained in research conducted at Cornell University, Ithaca, New York.

The book is bound in a flexible leatheroid cover, for handy, practical use. It will be available about Oct. 15.

TABLE OF CONTENTS

Botanicals
Sulfur
Tripolite
Diatomite
Calcium Limes
Magnesium Limes
Calcites
Dolomites
Gypsum
Mica
Vermiculite
Talc
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British Crop Protection Conf.

The National Crop Protection Conference scheduled for Oct. 31-Nov. 3, at the Winter Gardens, Eastbourne, England, will include discussions on the use of insecticides, and fungicides in agriculture and horticulture. Specific reports will deal with the advantages of high and low volume spraying; control of pests in arable crops; new developments in the application of gamma-BHC/ organo-mercurial seed dressings; the residues problem; and control of various pests on specific fruit, vegetable and cereal crops.

•

New Lion Sales Exec.

Bernard M. Machen has been named assistant general manager of chemical sales for Lion Oil Co., El-Dorado, Ark. Mr. Machen was formerly district chemical sales manager at Montgomery, Ala., since 1949.

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Ky. Favors High Analysis Fert.

Sales of mixed fertilizers with more units of plant foods are increasing rapidly over straight materials and those having fewer units of plant foods, according to Bruce Poundstone, head of the Feed and Fertilizer Department at the University of Kentucky Agricultural Experiment Station.

He cited the case of 5-10-5 which was unheard of five years ago, yet today is the leading fertilizer with 70,000 tons sold. The second most important grade, 3-12-12, with 63,000 tons sold, has more than doubled its tonnage sale.

Grades formerly important, but now not recommended, have shown a rapid decline. For example, grade 6-8-6, which at one time sold close to 100,000 tons per year, is down to less than 40,000 tons, he reported.

Mixed fertilizers accounted for less than 70 percent of total sales five years ago, he said, but now have been upped to 80 percent.

Records further reveal that fertilizer grades recommended by the Experiment Station are more popular with farmers than grades not listed. Seventy percent of the fertilizer bought by farmers the past year was of grades on the Station's recommended list. This is in contrast to only 10 percent in 1948.

•

Texas Study on Insecticides

The Department of Entomology of Texas A. & M. College has undertaken studies to evaluate new formulations of high analysis insecticides, R. D. Lewis, director, announced recently. The evaluations, if successful, will provide more effective control of cotton insects. The work is being done under a grant of aid provided by Olin Mathieson Chemical Corporation.

•

Nopco Co. Founder Dies

Charles P. Gulick, 70, chairman of the board and former president of Nopco Chemical Co., died early in September. Mr. Gulick was one of the founders of the Nopco Co., Harrison, N.J., which was first carried on under the name of the National Red Oil & Soap Company in 1907.

Vulcan Plant Mgr.

Paul A. Jones has just been named plant manager of Vulcan Steel Container Co., Birmingham, Ala. He will be in charge of all manufacturing at the company's main office and plant in Birmingham.



Vulcan Steel Container Co., has just completed the installation of a new pail production line and is now adding a new building which increases manufacturing and storage area by over 50% to provide for the adding of more production capacity for new sizes of containers.

•

Chemists Meet Oct. 11-13

Almost 200 papers dealing with the application of science to the practical problems of protecting the health and pocketbook of consumers and farmers will be delivered at the 69th annual meeting of the Association of Official Agricultural Chemists at the Shoreham Hotel in Washington, D. C., October 10, 11, and 12.

At this meeting the Association will release the eighth edition of its publication "Official Methods of Analysis of the Association of Official Agricultural Chemists," a 1000-page compilation of methods of analysis for agricultural commodities that is used by law-enforcement, industrial, and research scientists. This volume, which is revised every five years, was edited by William Horwitz of the U. S. Food and Drug Administration assisted by H. J. Fisher of The Connecticut Agricultural Experiment Station, A. H. Robertson of the New York State Food Laboratory, and Helen Reynolds, assistant editor of the Association.

The impact of the Miller Amendment of 1954 to the Food, Drug, and Cosmetic Act setting up the machinery for the establishment of tolerances for poisonous pesticide residues in foods will be discussed at this meeting. Dr. A. K. Klein of the Food and Drug Administration will describe the methods used to isolate and identify trace amounts of endrin in leafy vegetables which were voluntarily destroyed by the packer before they reached consumer channels. The growers of the vegetables had used this substance contrary to state and federal recommendations with the result that dangerous residues remained on the food. Other reports on methods of analysis for pesticidal residues will be given by chemists of the Food and Drug Administration and by Dr. Charles W. Gehrke of the University of Missouri.

•

Spencer Annual Report

Sales of Spencer Chemical Co. in the fical year ended June 30 set a new record but net income was down somewhat because of non-recurring charges incident to the start-up of a new polyethylene operation, Kenneth A. Spencer, president, told stockholders in the annual report.

Net sales for the fiscal year were $36,154,921, compared with $34,104,178 a year earlier and the gain was accounted for by the larger volume of products sold, primarily from the Vicksburg (Miss.) Works.

Net income for the fiscal year amounted to $5,118,454, equal to $4.04 a share as compared with $5,287,084, or $4.53 in 1954.

•

Mo. Bank Sponsors Ag Talks

The Pulaski County Bank at Richland, Missouri recently held a meeting on soils and fertilization for farmers. Two speakers were featured on the program; Mr. John Falloon, Extension Soils Specialist of the University of Missouri, College of Agriculture, and Mr. Perry Onstot, Davison Chemical Company, Division of W. R. Grace & Company, Joplin, Missouri. The speakers discussed the various aspects of soil fertility and plant nutrition and conducted a question and answer period following their discussion.

The soils meeting was one of a series of Farm Forum meetings conducted by the Bank in the interests of better farming. Mr. Gordon Warren of the Pulaski County Bank, who made the arrangements for the meeting, announced that the meetings were offered as a public service feature by the Bank to help keep farmers in that area informed and to assist in any way possible in providing farmers with an opportunity to hear and discuss timely farm topics.

Pitts Coke Names Parr

Pittsburgh Coke & Chemical Co.'s research and development department has announced the appointment of Thaddeus Parr to its staff. Dr. Parr, an entomologist, will serve as advisor to the company's agricultural chemicals research group and will assist the agricultural chemicals division on field testing and sale of insecticides.

•

Carbide to Buy Ofc. Site

Union Carbide and Carbon Corp., New York, is planning to buy property in New York City on which a modern 41-story building will be erected for the new home offices of the corporation. It is hoped that the new building may be made ready for occupancy some time in 1958.

•

IMCC Fla. Plant Bombed

The Bonnie phosphate chemicals plant of International Minerals & Chemical Corporation near Bartow, Florida, was damaged by a dynamite bomb set off August 29th according to officials of the company. The dynamiting took place on the ninetieth day of the strike by local 35 of the International Chemical Workers Union in the course of which negotiations have been punctuated by other acts of violence.

During the strike period portions of the plant have continued in operation by members of the supervisory staff. The dynamiting took place in the central control room of the sulphuric acid plant, one of the vital points of operation. Personal injury was avoided by the fact that members of the supervisory crew had not yet reported for duty.

Preliminary estimate of the damage is believed to be in excess of $50,000 and approximately two months may be required to repair the damage, however, temporary repairs requiring a week to ten days were made at once so the plant could continue operating.

Officials of the company promptly offered a reward of $5,000 for information leading to the arrest and conviction of persons responsible for the dynamiting of the Bonnie plant.

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New Calspray Office Space

California Spray-Chemical Corp. of Richmond, Calif., has announced recently the award of a contract to Richmond's C. Overaa and Co., for the construction of a new wing on the present Calspray administration building to house additional office space for Calspray's administrative and office personnel. Construction was started on the project August 15.

When finished, the new wing will include new offices for Calspray's top management as well as improved facilities for the company's manufacturing department, merchandising sales, foreign sales and fertilizer sales divisions. Also planned are enlarged quarters for Calspray's engineering staff and machine accounting group, as well as a new and completely equipped conference room. In all, the new wing will add 8,000 sq. ft. of floor space to Calspray's present facilities. The new wing will be completed in January, 1956.

•

Simplot Names Midwest Mgr.

The appointment of William R. Burgess as manager of midwest sales for the fertilizer division of J. R. Simplot Co., Pocatello, Ida., was announced recently. In revealing the appointment, Ben D. McCollum, Simplot sales manager, stated that the action, in effect, establishes midwest sales headquarters at Greeley, Colorado, from which city Burgess will service the territory.

The new appointee was formerly manager of the Simplot Soilbuilders unit at Greeley. That position will be filled by Larry Schumacher, who managed a branch unit at Swink, Colorado.

O-M Awarded Design Prize

The offices of Olin Mathieson Chemical Corp. at 460 Park Avenue, New York, have been judged the best of 110 entries in two categories in awards presented annually by *Management Methods* Magazine. Olin's conference room won the prize in this grouping, and the company also won a prize for the "Best Special Situation Solution."

Both areas, as well as all of Olin's offices in 460 Park Avenue, were designed by Designs for Business, Inc., who submitted the Olin Mathieson offices for judging.

•

McMahon, Vulcan VP



Geo. E. McMahon has recently been elected to fill the newly created position of executive vice president of Vulcan Containers Inc., Bellwood, Ill. Mr. McMahon has been active in the steel shipping container industry for the past twenty-four years, twenty-two of which have been with Vulcan. He steps up from his previous position of vice president in charge of all manufacturing departments and personnel.

•

Childress Joins Frontier

John B. Childress, Midland, Texas, has been appointed sales representative for Frontier Chemical Co., Wichita, Kansas. He will serve the oil industry and other users of basic chemicals in the Texas area from the Frontier sales office at Midland.

Childress was associated for the past eight years with the Chemical Process Company in various technical and sales engineering capacities, most recently as district sales manager for west Texas and New Mexico.

•

NPFI Award to Ill. Club

The agronomy club of the University of Illinois, Urbana, has been named the best student agronomy organization of its kind in the United States and winner of a trophy and $100 presented by the National Plant Food Institute.

The Illinois group, known as the Field and Furrow Club, received the National Agronomy Achievement Award for 1955 at the annual meeting of the American Society of Agronomy in Davis, California, on August 17. The presentation was made to the club's president, Duane Swarts, Dixon, Iillinois, by Dr. Willard H. Garman, chief of agronomic relations for the National Plant Food Institute. Along with Swarts, seven members of the club were on hand in Davis to receive the award and attend the annual meeting of the Student Section of the American Society of Agronomy.

NYS Insec.-Fung. Conf. Nov. 8

The 17th annual New York State Insecticide and Fungicide Conference and eight annual Pesticide Application Equipment Conference will be held November 8-10 in Bibbins Hall, GLF Exchange, Terrace Hill, Ithaca, N. Y.

•

Du Pont Data in Spanish

A new compilation of reference sheets printed in Spanish gives detailed information about the composition and use of certain Du Pont agricultural chemicals — insecticides, herbicides, and fungicides for controlling plant diseases.

Subjects covered in the reference sheets now available are: "Karmex" W Herbicida Para La Agricultura; Matamalezas "Telvar"; Matamaleza y Matabroza "Ammate" X; Matamalezas 2,4-D Amina y Ester; Matamalezas TCA Sodico Al 90%; Matabrozas 2,4,5-T Ester; Matabrozas De Ester 2,4-D—2,4,5-T; Insecticida de Metoxicloro "Marlate" 50; "Marlate" 2-MR Insecticida Emulsionable de Metoxichloro; Insecticida EPN 300; Insecticida HCB "Lexone" 10-GW; Insecticida De DDT "Deenate" 50-W; Fungicida Maneb "Manzatae"; Fungicidas Zineb y Nabam "Parzate"; Fungicida Ferbam "Fermatae"; Fungicida Ziram "Zerlate"; Compuesto Copper-A; "Krenite" 26 Rocio Dinitrado; Esparcidor-Adherente.

In addition to those now available, a sheet on the use of "Karmex" herbicides in sugar cane fields is being perpared.

•

Wisc. Insect Conf. Jan. 11

The annual meeting of the Wisconsin Insect Control Conference with Industry will be held January 11-12, 1956, at the Loraine Hotel, Madison, Wisc.

•

Founder of Lirio Chem. Dies

Philip E. Lirio, mayor of Vineland, N.J., from 1925 to 1929, died late in August at his home. He was 70 years old. Mr. Lirio was a founder of the Lirio Co., which manufactures insecticides. He retired from business 3 years ago.

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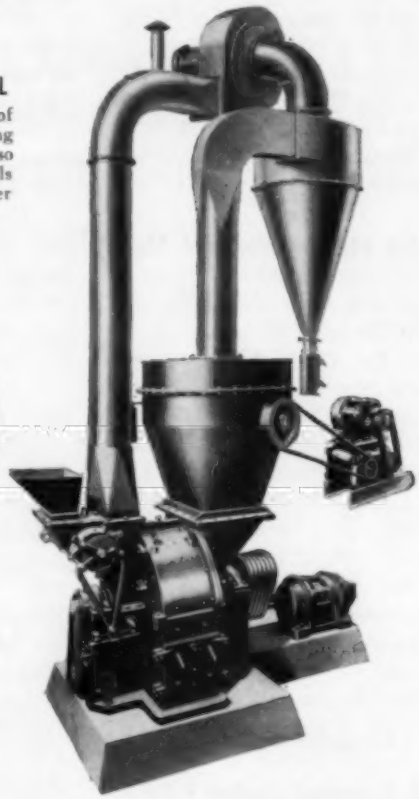
Clean, dust-free operation and the automatic handling of the product from feed hopper to finish bin, as well as the ability to make all grades of insecticides and diluent materials in producing intimately blended mixtures, are valuable features of Raymond Mills.



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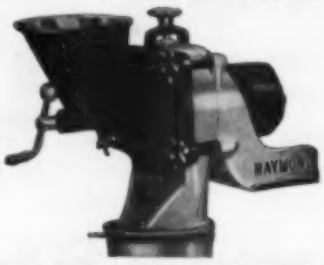
All-purpose unit for preparation of insecticide formulations, including sulphur-bearing products. Also built in large capacity Super mills for handling 30 tons or more per hour.

Write for Bulletin No. 68 for further details of Raymond insecticide grinding Mills.



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Cutworms in New Jersey

Night-feeding cutworms are destroying vegetables and small grains throughout New Jersey, reports Dr. Leland G. Merrill, extension entomologist at the College of Agriculture, Rutgers University. These large caterpillars hide in the soil during daylight hours and then come out at night to feed on spinach, broccoli, lettuce and cover crops.

Dr. Merrill urges farmers to be alert to the danger, and if they find cutworms to scatter poison bran bait at the rate of at least 25 pounds to the acre. Also effective, he says is a 5 percent DDT or toxaphene dust, but these must not be used if vegetables will be contaminated.

•

Henderson Co. Move to N. J.

Peter Henderson, Stumpp & Walter Co., announced recently that the name has been changed to Breck's Home & Garden Centers, and that the new address is Route 24, Morris Turnpike, Millburn, N. J.

•

Kraft Sales Personnel

Kraft Bag Corp., Gilman Paper Co., announced early last month that Ed Burgers, Jr., for over 3 years sales representative in the St. Louis area, has been assigned to the New York office to concentrate on new business development in metropolitan New York and New York State. His replacement in St. Louis is Frank C. Joos, Jr., for almost 10 years with Bemis Bros. at Peoria, Ill. Mr. Joos will cover the states of Missouri, Southern Illinois, Eastern Oklahoma, and Arkansas, reporting to Dean Wellington, western sales manager in the company's Chicago office.

Other appointments and announcements by Kraft Bag Corporation include:

R. F. Floyd, formerly with Union Bag, covers New England and metropolitan New York, working out of the New York office.

R. E. Kunze, formerly with Fulton Bag, represents Kraft Bag Corp. in Kansas, part of Iowa, Northwest Missouri, Central and Western Oklahoma. His headquarters are in Kansas City.

R. A. Kurlander, formerly with Westinghouse Mfg. Co., has joined the company's Kraftpacker sales division as field engineer on packaging machinery in the southernmost states, operating out of Montgomery, Alabama.

•

IMCC '55 Sales Up 3.1%

For the sixteenth consecutive year net sales of International Minerals & Chemical Corp., Chicago, showed an increase over the preceding year, according to the corporation's annual report for the fiscal year ended June 30, 1955. Net sales for the fiscal year were $96,485,017 and 3.1 per cent higher than sales for 1954.

Net earnings of the corporation were $6,321,903, compared with $6,043,979 for the preceding year. This was equivalent to $2.55 per share of common stock outstanding, compared with $2.44.

•

Amizole Testing Extended

American Chemical Paint Co. is planning further tests with aminotriazole (trade name, *Amizol*) on Canada thistle, quack grass and nutgrass, for herbicidal properties. The chemical, formerly used only in limited amounts in photographic film manufacture, showed much promise in recently completed field tests against Canada thistle, quackgrass and nutgrass. It also is effective on brush plants like ash, red maple, poison ivy, and scrub oak. Used as a cotton defoliant, Amizol also appears to have possibilities.

CFA Conf. Nov. 6-8

The California Fertilizer Association announce that the 32nd annual convention will be held at the Hotel Mark Hopkins, San Francisco, November 6, 7 and 8. About 475 persons will attend from all parts of the United States and from Canada.

William G. Hewitt, Berkeley, chairman of the convention program committee, reports a very brief, but outstanding program for the business session. Four directors and officers for 1956 will be elected, and the annual budget will be presented for approval.

•

Olin-M Names Rockefeller

Laurance S. Rockefeller was recently elected a member of the Board of Directors of Olin Mathieson Chemical Corp., Baltimore. Mr. Rockefeller is president of Rockefeller Brothers, Inc., N. Y.

•

Bryan Joins Conn. Station

Appointment of Walter H. Bryan, of Harrisburg, Pa., to the staff of the department of plant pathology and botany at the Connecticut Agricultural Experiment Station was announced last month.

Mr. Bryan was formerly with the University of Wisconsin, where he held a Wisconsin Alumni Research assistantship. In his new position, Mr. Bryan will conduct investigations in three distinct lines. One of his research projects will have to do with learning more exactly the nature of Connecticut tobacco components which give flavor and aroma to the finished product.

Nelson Completes Building Program



This 30,000 gallon anhydrous ammonia high pressure storage installation was recently completed by Edward S. Nelson. The plant pictured here is located at Red Budd, Illinois.

Twelve new bulk plants for the storage and distribution of anhydrous ammonia have been installed in Indiana, Illinois, Wisconsin and Michigan. These plants were installed by Edward S. Nelson, Ltd. of Clarksdale, Miss. The twelve new plants, mainly 30,000 gallon installations, were built for bulk distributors in these areas, all anhydrous ammonia customers of the Olin Mathieson Corp., Baltimore, Maryland.


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New Canadian Fert. Plant

Northwest Nitro-Chemicals, Ltd., have arranged financing plans for a chemical fertilizer plant near Medicine Hat, Alberta, Canada. The new plant will have an annual capacity of 35,000 tons of ammonium nitrate and 107,000 tons of ammonium phosphate.

•

Okla. Plant Food Conf. Nov. 28

The annual meeting of the Oklahoma Plant Food Association will be held at the Memorial Union, Oklahoma A & M College, Stillwater, Okla., November 28-29.

One of the speakers at this meeting will be Dr. Vincent Sauchelli, Davison Chemical Co., Baltimore, who will discuss some of the recent developments in phosphate fertilizers.

•

Calspray Plant in France

California-Spray Chemical Cie Francaise, announced late last month that plans have been completed for a $1,500,000 captan plant in France. The new plant is expected to be in production in the fall of 1956.

•

Amer. Ag. Appoints Benham

The American Agricultural Chemical Co., New York, announced late last month the appointment of G. H. Benham as director of its research and process development. Dr. Benham was formerly with the Armour Research Found. of the Illinois Institute of Technology.

•

Simplot Names Sales Mgr.

Austin Richins has been advanced to the position of assistant sales manager of J. R. Simplot Co., Fertilizer Division, Boise, Idaho. Mr. Richins has been with Simplot since 1946.

•

Khapra Beetle in Farmers Buln

A revision of a Farmers' Bulletin has just been issued by the U. S. Department of Agriculture, which includes information on the Khapra Beetle. The bulletin gives information on the recognition and control of this pest. It discusses too, the grain weevil, grain borers, grain moths, flour moths, grain and flour beetles, mealworms, spider beetles, miscellaneous beetles, booklice, silverfish, cockroaches, flour or grain mites, and parasites of grain pests. The bulletin is entitled the "Stored Grain Pests."

•

Spencer Advances Keith



Spencer Chemical Co., Kansas City, Mo., announced last month appointment of Kenneth A. Keith to the position of manager of agricultural chemicals market research. Mr. Keith has been with Spencer eight years, the last four as Wisconsin sales representative. Earlier, he served as assistant to the agricultural chemicals sales manager and as market analyst.

•

Rutgers' 75th Anniversary

Secretary of Agriculture, Ezra Benson, and New Jersey Governor Meyner were scheduled to address the Rutgers University convocation on October 6th, marking the 75th anniversary of the establishment of the New Jersey Agricultural Experiment Station. Rutgers planned to confer an honorary doctor of science degree on Secretary Benson.

Three other leaders in science and agriculture were to receive the same degree: Charles Franklin Seabrook of Bridgeton; William H. W. Komp of College Park, Md.; and G. Willard Burton, Tifton, Ga.

The convocation was scheduled to be held in Voorhees Chapel, Douglass College, adjoining the College of Agriculture.

•

Ohio Pesticide School, Nov. 16

The Ohio Pesticide Institute announces that its ninth annual school and conference will be held at the Fort Hayes Hotel, Columbus Ohio, Nov. 16 and 17.

•

Oregon Weed Conf. Nov. 9

The Oregon Weed Conference for 1955 will be held at the Senator Hotel, Salem, Oregon, November 9th and 10th. Rex Warren, secretary-treasurer of the Association reports that program details will be announced later.

•

Crowther Named by Frontier

Frontier Chemical Co., Wichita, Kans., announced recently the appointment of John W. Crowther as product manager for chlorinated solvents. The solvents are a new line to Frontier's present production of chlorine, caustic soda, muriatic acid, benzene hexachloride and other chemicals.

•

Tiger Adds Fertilizer to Line

The Tiger Chemical Co., Onawa, Ia., announced plans for the manufacture of liquid fertilizer solutions. The company is adding an aqua ammonia converter, an ammonium phosphate cooker, and other equipment in their reactor circuit.

•

Schoenfield Rejoins Emulsol

H. Schoenfield, recently of Velsicol Chemical Corp., has rejoined Emulsol Chemical Corp., Chicago, as manager of technical sales service.

Emulsol also announces a revised product list is now available, which describes its line of surface active agents.

•

CSMA Proceedings Available

Proceedings of the 41st mid-year meeting of the Chemical Specialties Manufacturers Association, held last May in Chicago, are available through the Association at $7.50 a copy. The proceedings contain complete transcripts of some 40 technical and marketing papers.

•

Ex-Pres of Davison Dies

C. Wilbur Miller, former president of Davison Chemical Co., Baltimore, and now a division of W. R. Grace & Co., New York, died September 21st in Baltimore. He was 77 years old. Mr. Miller was former chairman of the board of Jefferson Lake Sulphur Co. and former head of Silica Gel Corp.



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USDA Award to Kerrville Laboratory



(l to r) R. C. Bushland, Kerrvile Laboratory; E. C. Cushing; G. W. Irving, Jr., Agricultural Research Service; (standing) E. F. Knipling, Entomology Research Branch, USDA; J. G. Cox, Rev. B. E. Breihan, and Kerrville mayor, J. L. Bullard.

The USDA District Service Award was presented September 12th to the members of Kerrville Laboratory of the Agricultural Research Service at Kerrville, Texas. Dr. R. C. Bushland, who heads the laboratory, accepted the award at ceremonies held in Kerrville. G. W. Irving, Jr., of the Agricultural Research Service made the presentaion.

Major contributions which Secretary of Agriculture, Ezra Benson recognized in giving the award were:

1. Development, evaluation, and recommendation of a variety of insecticides for the control of biting flies, ticks, lice and screw-worms.
2. Estimation of the maximum safe doses of modern insecticides so that recommended treatments could be made with ample margin of safety.
3. Development of improved methods of chemical analysis and the use of these analytical procedures to establish that chemicals applied for insect control would not contaminate meat or milk.
4. Development of a new principle of insect control which involves the use of sterilized insects. Screw-worms were eradicated from the Island of Curacao through release of flies sterilized by gamma rays from radiocobalt. This new method of insect control may eradicate screw-worms from the Southeastern States and should have practical application against many other insects.

•

Safety Award to Davison

For the fourth time in five years Davison Chemical Co., Division of W. R. Grace & Co., has won the "Award of Honor" of the National Safety Council, the highest award which the council grants.

Marlin G. Geiger, president of Davison, joined with A. B. Pettit, the company's director of Industrial Health & Safety, in accepting the award from J. W. Carothers, president of the Baltimore Safety Council.

To win the honor, Davison on a company-wide basis in 1954 scored a 58% reduction in frequency of accidents and a 32% reduction in severity of accidents.

In addition to the national award, the Safety Council's Award of Merit went to four plants operated by Davison.

Hardinge CONSTANT-WEIGHT FEEDERS
for Fertilizer Blending



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Many internationally known fertilizer manufacturers use the Hardinge Constant-Weight Feeder for their blending processes. Users of the Hardinge Constant-Weight Feeder for accurate fertilizer blending and mixing include:

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Farm Fertilizers, Incorporated
Stauffer Chemical Company
Sugar Beet Products Company
Baugh Chemical Company
American Agricultural Chemical Company
Smith-Douglass Company
Farm Belt Fertilizer Company
Virginia-Carolina Chemical Corporation
Comptoir des Phosphates Tunisiens (Tunisia)
The Fertilizer Plant, Incorporated (Iceland)

Give us pertinent details of your fertilizer ingredients and characteristics when writing for additional information. Bulletin 33-E-57.

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Monsanto-Lion Merger

The merger of Lion Oil Co. into Monsanto Chemical Co. as agreed upon by the directors of both corporations on July 21st, was approved by Monsanto and Lion shareowners at meetings held in St. Louis and El Dorado, Ark, respectively on September 23.

•

Cautions in Weed Spraying

Weed spraying with properly selected chemicals can save a lot of hard labor even in small home gardens, but unless care is taken to prevent drift, some treasured or valuable plants may die with the weeds, University of Tennessee agricultural extension specialists report.

This is particularly true when 2,4-D and 2,4,5-T materials are used, because some plants are very susceptible to even small quantities of these chemicals.

To keep the spray from drifting, a shielded boom or sprayer wand is recommended for spraying weeds close to flowers and shrubs. Another important thing is to keep the pressure down, they caution. High pressure is not needed to kill weeds and there is less drift with low-pressure sprays. Heat, they caution, tends to make the weed killer more volatile so that its fumes may damage nearby plants on days when temperatures range above 90 degrees.

•

IMCC Mica Plant in Tenn.

International Minerals & Chemical Corp., Chicago, has begun construction on a mica plant at Greeneville, Tenn. The plant is expected to be in production in the spring of 1956.

•

Leaf Feeding 95% Efficient

"Foliar feeding—the spraying of soluble fertilizers on the leafy parts of the plant—is by far the most efficient method of supplying crops with necessary minerals," in the opinion of Dr. H. B. Tukey, chief horticulturist at Michigan State University.

Dr. Tukey told a Senate subcommittee on atomic energy that with the use of radioisotopes researchers have established the fact that 95 percent of soluble fertilizers applied to the leaves of crops are used by the plants. Only 10 percent of the fertilizer applied to the soil is consumed, he said.

•

Wants Fert. Information

Henry W. Sutton, citrus fruit grower in the Murray Valley, Wentforth, NSW, Australia, will arrive in the U. S. early in October, and is interested in information on citrus production, such as leaf fertilizing, general production and grove inspection. He can be contacted through the Australian Counsel in New York.

LETTER TO THE EDITOR

Dear Editor:

Please accept our sincere congratulations for the excellent article which appears on page 39 of your September issue. This article is entitled "Insecticides on the "Pan" Again in New Book by Organic Gardening Devotee" and has to do with the new book by Leonard Wickenden entitled OUR POISONED WORLD. This article is very much to the point and if it is available in its complete form including your letter to Dr. Biskind I should like a quotation on 200 such reprints for distribution to our entire membership.

Sincerely,

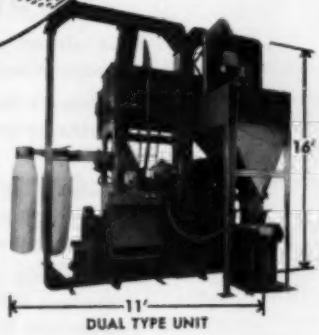
SIDNEY H. BIERLY,
Executive Secretary & Manager
California Fertilizer Association

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5. **Is readily soluble in all common organic solvents — and, in fact, is a *solvent* in its own right.**
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MEETING CALENDAR

Oct. 3-5 — Carolinas-Virginia Pesticide Formulators Association. Holly Inn, Pinehurst, N. C.

Oct. 10-15—Control Official Meeting as detailed below: Shoreham Hotel, Washington, D. C.

Oct. 10-12—Association of Official Agricultural Chemists

Oct. 12-13—Association of American Feed Control Officials

Oct. 13-14—Association of American Fertilizer Control Officials

Oct. 14—Association of Economic Poisons Control Officials

Oct. 11 — Western Agricultural Chemicals Association meeting, Claremont Hotel, Berkeley, Calif.

Oct. 11-12—Fertilizer Round Table, 3rd annual meeting. Carlton Hotel, Washington, D. C.

Oct. 13-14 — National Nitrogen Solution Association, State Armory, Springfield, Ill.

Oct. 13-14 — Canadian Agricultural Chemicals Association, annual meeting, Sainte Adele, Quebec, Canada.

Oct. 16-20 — National Pest Control Association. Cosmopolitan Hotel, Denver, Colo.

Oct. 17-21 — National Safety Congress & Exposition. Chicago, Ill.

Oct. 18-20 — Entomological Society of Canada. Fredericton, B.C.

Oct. 19-21—International Conference on Use of Antibiotics in Agriculture, Jefferson Memorial Auditorium, Washington D. C.

Oct. 27 — Middle West Soil Improvement Committee, annual business meeting. Sherman Hotel, Chicago.

Nov. 2-3—Pacific Northwest Plant Food Assn. Pilot Butte Inn, Bend, Oregon.

Nov. 3-4—Northeastern Division American Phytopathological Society, Springfield, Mass.

Nov. 4 — Fertilizer Section, South Carolina Annual Accident Prevention Conf., Hotel Francis Marion, Charleston, S. C.

Nov. 7-8—California Fertilizer Assoc., 32nd annual meeting, Hotel Mark Hopkins, San Francisco.

Nov. 8-10—New York State Insecticide Fungicide Meeting, Cornell University, Bibbins Hall, GLF Exchange, Ithaca, N.Y.

Nov. 14-15—Commercial Chemical Development Association and Chemical Market Research Association. Carter Hotel, Cleveland, Ohio

Nov. 21-22—Eastern Branch, ESA, Lord Baltimore Hotel, Baltimore, Md.

Nov. 28-29 — Oklahoma Plant Food Assn., Memorial Union, Stillwater, Okla.

Nov. 28 - Dec. 1 — Entomological Society of America, Annual Meeting, Netherlands Plaza, Cincinnati.

Dec. 5-7 — Chemical Specialties Manufacturers Assn. Roosevelt Hotel, New York City.

Dec. 5-9 — Exposition of Chemical Industries, Convention Hall, Philadelphia.

Dec. 5-7 — Agricultural Ammonia Institute, Kansas City, Mo.

Dec. 15-16—Beltwide Cotton Production Conference, Hotel Peabody, Memphis, Tenn.

Dec. 28-30 — American Phytopathological Society of America, Biltmore Hotel, Atlanta, Ga.

Dec. 29th — American Association for the Advancement of Science, Municipal Auditorium, Atlanta, Ga.

Jan. 4-6—Weed Society of America, Hotel New Yorker, New York City.

Jan. 10-11—North Carolina School, North Carolina State College, Raleigh, N. C.

Jan. 11-12—Wisconsin Insect Control Conference with Industry, Lorraine Hotel, Madison, Wisc.

Jan. 16-18 — N. W. Vegetable Insect Control Conf., Imperial Hotel, Portland, Ore.

Jan. 18-20 — Western Cooperative Spray Project, Imperial Hotel, Portland, Ore.

Jan. 24-26 — Midwestern Garden Supply Trade Show, International Exposition Hall, Chicago.

Jan. 26-27—Custom Spray Operators' Training School, University of Illinois, Illini Union Ballroom, Urbana, Ill.

Jan. 27 — Colorado Agricultural Chemicals Association, joint meeting with Colorado A & M College. Cosmopolitan Hotel, Denver, Colo.

Jan. 30-Feb. 3—Illinois Pest Control Operators, Purdue University, Lafayette, Ind.

Feb. 7-9 — N. Y. Garden Supply Trade Show, Kingsbridge Armory, New York City.

Feb. 15-17—California Weed Control Conf., Sacramento & Davis, California.

March 28-30—North Central States Branch of ESA, Purdue Memorial Union, Lafayette, Ind.

Brevities

MARSHALL E. MILLER has been employed by the Agricultural Marketing Service USDA as an agricultural economist stationed at New Orleans, La.

AC

THE VORHES CHEMICAL CORP., Charles City, Ia., manufacturer of bulk and sack fertilizer, was scheduled to begin production early in September. Ralph W. Zastrow is president of the new firm which is capitalized at $200,000.

AC

FRANK M. EWER, director of the Boston Burlap Department of Bemis Bros. Bag Co., retired September 30 after 59 years of service with the company.

AC

PENNSYLVANIA CRUSHER DIVISION, West Chester, Pa., has developed a new crusher for the chemical and fertilizer industries.

AC

SOUTHWEST POTASH CORP., New York, is expanding its potash mine and mill at Carlsbad, New Mexico. Capacity will be increased by 1/3 at an estimated cost of $2,500,000.

AC

WILLIAM M. CLINES, western sales manager of heavy chemicals for American Potash & Chemical Corp., has been elected president of the Chemical Research Market Association of Southern California.

AC

CHARLES F. HOLLIS, INC., Bennettsville, S. C., obtained a charter early in September to operate fertilizer warehouses; buy and sell fertilizer, soil amendments, insecticides, etc. Authorized capital stock is $15,000.

AC

AMERICAN CYANAMID CO's phosphate plant at Brewster, Fla., settled a strike which began June 1. Workers returned to work the week of September 12th.

AC

SPENCER CHEMICAL CO., named George E. Frey as production manager of the company's Henderson Works. He succeeds the late W. M. Yeandle.

Suppliers' BULLETINS

New Bulk Storage Unit

A new steel bulk storage unit for fertilizer, rock phosphate and other free-flowing materials has been developed by Andrews Machine Company, Decatur, Ill. This unit is available in 10 and 25 ton capacities. It has a hopper bottom with swing control gate which reportedly allows more effective discharge control. A manhole and cover for loading is located on the top with ladder leading down the inside for easy access into the pit.

•

Prentiss Buln. on Labels

A new "Prentox Information Bulletin" has been published by Prentiss Drug & Chemical Co., New York. It contains a suggested label outline for Prentox Pyronyl Dust Concentrate in combination with Rotenone and fungicides. Copies are available upon request to the company.

•

Fertilizer Content Indicator

New literature describing simple methods of measuring moisture content and salt or fertilizer content of soil is available from Industrial Instruments, Inc., Cedar Grove, N.J. Theory and actual procedure methods are described in detail in the bulletin. In addition, a complete listing of indicators, soil blocks, and automatic irrigation control equipment is cataloged.

•

New Lilly Garden Compost

A new already-prepared compost for use in enriching flower and vegetable gardens, lawns, shrubs, trees, greenhouse beds, house plants and farm plots is announced by the Chas. H. Lilly Co., Seattle, Wash.

The new product has been named "Miracle Mix" and is now available for both home and commercial gardeners in a range of container sizes from house-plant packages to bulk quantity sacks.

A blend of phosphated feed-lot manures, blood and other selected organic materials, Lilly's compost contains a carbon to nitrogen ratio of not more than 20 to 1.

•

Liquid Fert. Bulletin

Victor Chemical Works, Chicago, recently issued an 8-page bulletin directed to formulators of liquid fertilizers. The bulletin describes tank preparation, equipment conversion, fertilizer analysis, preparing balanced products using either liquid or dry concentrates.

•

USDA Buln on Aircraft

An eight-page bulletin (ARS-81-2) on a hydraulic drive system for operating dispersal equipment in Agricultural Aircraft is available through the U.S. Department of Agriculture. The bulletin was prepared by Arthur Gierser, Donald Whittam and Kenneth Messenger of the Plant Pest Control Branch.

The hydraulic drive system, piston type pump, pressure relief valve, tubing and reservoir are among the items described.

•

TEAC-90 Bulletin

Process Chemical Specialties, Beverly, Mass., announced recently its bulletin 1-54 on "TEAC-90", which is used as an emulsifier and stabilizer aid. TEAC-90 is reported to solubilize and make available insoluble Mg and Fe salts, phosphates and other plant nutrients. It is suggested, too, for solid conditioners, as a sticking agent for insecticide sprays, and as a humectant.

Soils-Fertilizer Handbook

Davison Chemical Co., Division of W. R. Grace & Co., Baltimore, has published a 32-page brochure on "Soils, Phosphates and Fertilizers" by Vincent Sauchelli, the company's agronomist. It deals with fertilizer chemistry in laymen's terms, and is addressed, in the author's words, to "salesmen, farmers, and laymen in general to give in simple, understandable language some essential, practical information on the feeding of soils and crops."

Mr. Sauchelli discusses kinds of soil, what soils contain moisture supply, water requirements of crops, controlling soil moisture, how plants feed, chemical fertilizers and soil fertility, plant constituents, plant nutrients, humus, commercial fertilizers and soil amendments, secondary and trace elements, using fertilizers, fertilizers materials, phosphates, and the relative value of phosphatic fertilizers.

•

Booklet on Warfarin

Prentiss Drug & Chemical Co., Inc., New York, has just published a 3rd edition of its booklet on Rax Powder (Prentiss Warfarin Concentrate). The new booklet describes the damage done by rats in the United States annually and explains the physiological action of Warfarin. It contains manufacturing information, bait formulas and suggestions on proper use of Rax Powder.

•

Bulletin on Acrylic Esters

Ethyl acrylate, n-butyl acrylate, 2-ethylbutyl acrylate and 2-ethylhexyl acrylate are described in a technical bulletin issued recently by Carbide and Carbon Chemical Co., a Division of Union Carbide and Carbon Corp., New York.

The new booklet covers methods of polymerization, applications of polymers and copolymers, and selected references. Physical and chemical properties, shipping data, and reactions of the acrylic esters in chemical syntheses are included. Acrylic esters are important intermediates in the manufacture of pharmaceuticals, insecticides, and other compounds.

New Fischbein Bag Closer

The Dave Fischbein Co., Minneapolis, announced recently a new model electric portable bag closer which will accommodate most bags in use by industry.

The new model is reported to close from the lightest to the heaviest textile or paper bag, whether asphalt treated or specially processed, with no change in parts or adjustments.

The machine is electrically powered by a 1/12 horsepower motor, and weighs 10½ pounds, including full cone of thread. It sews 40 feet a minute.

•

Lime Products Buln.

The availability of a reference manual concerning the manufacturing processes, applications and specifications of lime and lime product as applied to agricultural masonry, has been announced by the Ohio Lime Company, Woodville, Ohio.

•

NH_3 First Aid Kit

A first aid kit containing medical equipment to treat persons who have come in direct contact with anhydrous or liquid ammonia is offered by E. D. Bullard Co., San Francisco. The kit contains "Neutralize", which counteracts the effects of ammonia.

•

Kromer Offers Coating

O. W. Kromer Co., Minneapolis, announces a new metal coating called "Finish X" on its sprayers. The coating reportedly is not corroded by chemical solutions and liquid fertilizers.

•

Nozzles for NH_3 Solutions

Fertilizer manufacturers will be interested in a line of nozzles for injecting nitrogen solutions, anhydrous ammonia and acids separately or in combinations which has been developed by Thackston-Davis Supply Co., Columbia, S.C.

The injection nozzles are refinements of a basic single-manifold design developed by H. B. Davis, Spencer Chemical Co.'s South Carolina sales representative. By injecting ammoniating solutions approximately one inch from the mixer flights they provide better ammoniation than can be obtained from conventional spray pipes. By deflection and diffusion, solutions are brought into intimate contact with the superphosphates and potash. From four to eight nozzles are used, depending on the size of the mixer. Further information available from Thackston-Davis Supply Co.

Portable NH_3 Converter

A portable ammonia converter was recently engineered and manufactured for Nickel Processing Corp., Nicaro, Cuba. It was built by the J. C. Carlisle Corp., Denver, who have developed and are producing a line of portable ammonia converters for the production of aqueous ammonia, wherever desired. The manufacturer advises that efficiency of these units approaches 100%.

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TRADEMARK APPLICATIONS

HURRICANE, in hollow capitals, for agricultural insecticides and fungicides. Filed May 26, 1954 by Re-Mark Chemical Co., Inc., Miami, Fla. Claims use since Dec. 1952.

VITA TONE in heavy letters, lower case, for aluminum sulfate and dusting sulphur used as insecticides and miticides. Filed Sept. 8, 1953 by Leffingwell Chemical Co., East Whittier, Calif. Claims use since June 30, 1952.

GRANUFORM, in lower case, open face script, for pelletized fertilizer. Filed Dec. 13, 1954, by F. S. Royster Guano Co., Norfolk, Va. Claims use since Dec. 1, 1954.

MIDCO, in slanted capitals, for fertilizers. Filed Feb. 18, 1954 by California Spray-Chemical Corp., Wilmington, Del. Claims use since Aug. 1, 1953.

FERT-O-FISH, in capitals with drawing of fish, for fertilizer, either liquid or dry. Filed Mar. 25, 1951 by Sea-Land Products Co., Walteria, Calif. Claims use since on or about Oct. 3, 1951.

GRANULITE AG-SLAG, in capitals, for agricultural liming material comprising granulated slag. Filed Apr. 21, 1954 by Ferard H. Doscher, d. b. a. The Granulite Co., Chicago, Ill. Claims use since Aug. 9, 1950.

VIM, in script capitals and lower case, for fertilizer. Filed July 16, 1954 by F. S. Royster Guano Co., Norfolk, Va. Claims use since Jan. 1, 1930.

TENNCO, in stencil capitals, for fertilizer. Filed July 3, 1953 by Tennessee Corp., New York. Claims use since 1948.

TENNCOMIN, in stencil capitals, for fertilizer. Filed July 3, 1953 by Tennessee Corp., New York. Claims use since 1948.

FLO-CROP, in red capitals slanting upwards from left to right, for organic soil conditioner. Filed Apr. 5, 1954 by Jaffee Cotton Products Mfg. Co., Inc., Dallas, Tex. Claims use since Mar. 5, 1954.

ALFAFERT, in open-faced capitals, for fertilizers. Filed Oct. 18, 1954, by Smith-Douglass Co., Inc., Norfolk, Va. Claims use since spring of 1946.

NU-MANESE, in capitals forming semi-circle, for manganese compound used as fertilizer. Filed Dec. 6, 1954, by Tennessee Corp., New York. Claims use since Oct. 4, 1954.

SPENCER, in capitals, for ammonium nitrate fertilizer. Filed Dec. 13, 1954, by Spencer Chemical Co., Kansas City, Mo. Claims use since June 30, 1946.

FERTILIME, in script capitals within scroll, for fertilizers. Filed Oct. 18, 1954, by Smith-Douglass Co., Inc., Norfolk, Va. Claims use since spring of 1937.

ROYAL, in capitals with drawing of crown, for fertilizers. Filed Oct. 18, 1954, by Smith-Douglass Co., Inc., Norfolk, Va. Claims use since spring of 1933.

LAVA-LOAM, in capitals and lower case, for soil conditioner. Filed Aug. 5, 1954 by Texas Lightweight Products Co., Irving, Tex. Claims use since July 5, 1954.

FERTIL-TH, in capitals, for soil conditioner. Filed July 20, 1953, by Stanley O. Schlaf, d. b. a. S. O. Schlaf Laboratory, West Chicago, Ill. Claims use since July 1, 1953.

FLORA TOX, in capitals within black triangle, for chemicals used in killing weeds, grass and similar types of vegetation. Filed Sept. 8, 1953, by Wood Treating Chemicals Co., St. Louis, Mo. Claims use since Sept. 1, 1948.

FLO-MIX, in script capitals and lower case, for liquid fertilizer solutions of soil nutrients and conditioners including nitrogen, phosphates, and potash. Filed Nov. 2, 1953, by Plantation Chemicals, Inc., Houma, La. Claims use since Aug. 1, 1953.

REGAL LAWN FOOD, with latter two words enclosed in four sided figure under the word "regal" and disclaimed apart from mark as a whole. For fertilizers. Filed June 16, 1954, by Regal Products, Inc., Pontiac, Mich. Claims use since Jan., 1954.

AMNICAL, in capitals, for chemical fertilizers for agricultural purposes. Filed Sept. 10, 1953, by Societa Esportazione Importazione Fertilizzanti Azotati S. E. I. F. A. Soc. P. Az., Milan Italy. Italian application filed Mar. 14, 1953, Reg. No. 112,039, dated June 16, 1953.

CHIGUANO, in script capitals and lower case, for organic plant and soil food. Filed June 14, 1954, by Durham Soil-builders, Inc., Durham, Conn. Claims use since April 5, 1954.

JET-GRO, in capitals, for peat used as a soil conditioner. Filed Oct. 13, 1954, by Charles J. Marchell, Jet-Gro Peat Co., Torrington, Conn. Claims use since Apr. 24, 1952.

LAWNORGANIC, in capitals, for fertilizer. Filed Oct. 7, 1953, by United Seeds, Inc., Omaha, Nebr. Claims use since Apr. 1, 1953.

PEARL SUPER, in script capitals and lower case, for fertilizers. Filed Apr. 19, 1954, by Eerste Nederlandsche Cooperatieve Kunstmestfabriek, Vlaardingen, Netherlands. Claim ownership of Dutch Reg. No. 102,244, dated July 29, 1949.

AQUA-ZYME BIO-CATALYTIC SOIL CONDITIONER, in capitals with drawing of plant, for liquid soil conditioners. Filed Aug. 23, 1954, by Roy E. Hoover, Hoover Soil Service, Gilman, Ill. Claims use since May 1, 1954.

TRIPLE ROSE MAKER, in capitals for rose bush feed. Filed May 17, 1954, by The Stadler Fertilizer Co., Cleveland. Claims use since Feb. 17, 1954.

SOIL BLOOD, in capitals and lower case, for mineral soil fertilizer material. Filed Jan. 11, 1954, by Stanley A. Humphrey, d. b. a. U. S. Nitrate Co., Minneapolis, Minn. Claims use since Dec. 22, 1953.

ACS MEETING IN MINN.

(*From Page 51*)

been demonstrated in beef and dairy cattle, pigs, sheep, rats, and poultry. The change is apparently independent of the site of entry of the toxicant, since it occurs following either oral ingestion or subcutaneous injection. Dieldrin apparently is chemically unchanged in the body and is stored or excreted as such.

The Persistence of Insecticide Residues on Forage Crops. R. H. Carter, F. W. Poos, B. A. App, and Ray E. Ely, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Md.

A study was made of the persistence of residues of chlorinated insecticides on forage crops subjected to normal farm processes.

Growing alfalfa was sprayed with dieldrin, endrin, and heptachlor and samples for residue determinations were taken from the growing crop at regular 10-day intervals. The materials persisted on the foliage for more than 30 days in most cases.

Growing alfalfa was sprayed with toxaphene, chlordane, DDT, methoxychlor, lindane, aldrin, dieldrin, heptachlor, and endrin. After 3 to 10 days the hay was cut, field cured, baled, and stored in barns for 5 to 10 months. Samples selected as the hay was used in feeding experiments were analyzed for insecticide residues.

Hay that had been treated with insecticides was subjected to barn dryer treatments. Little loss was noted in the residues of DDT, chlordane and toxaphene.

The effects of the ensiling process on insecticide residues on alfalfa and corn were determined. On a dry weight basis little loss was noted in the residues of DDT, chlordane, and toxaphene.

An Evaluation of the Safety of Captan for Use in Warm Blooded Animals. R. W. Fogleman, Hazleton Laboratories, Falls Church, Va., and E. G. Batte, California Spray Chemical Corp., Haddonfield, N. J.

The acute oral LD_{50} of Captan (N-trichloromethylmercapto - 4 - cyclohexene - 1,2-dicarboximide) has been reported to be 9 grams per kg. of body weight in rats. Dogs and rats have been fed diets containing 5000 p.p.m. of Captan for extended periods of time without developing signs of toxicity or histological changes. Many species of domesticated animals have been fed diets containing high levels of Captan without ill effects, and no off flavor could be detected in the meat or milk of these animals.

WACA CONFERENCE

(*From Page 39*)

NAC Services to Members

NAC services available to members were outlined by James D. Hopkins, Hopkins Agricultural Chemical Co., Madison, Wisc., who reported that "perhaps the greatest service that the NAC has done for the formulator and for the entire agricultural industry is the great and successful effort it has made to present the facts that dispute irrevocably, the erroneous information peddled by ambitious publicity-seeking individuals through the medium of sensational journalism." Mr. Hopkins outlined the excellent job done by the Association in meeting the problem.

He defined, too, the role of NAC in the drafting and enactment of the Miller bill. "They (Lea Hitchner and staff) contributed to the develop-



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ment of a law that the formulator could live with . . . a law that would protect the population of our country, yet give those responsible for the production of the nation's food, the agricultural chemicals they so badly need . . . chemicals that are absolutely essential if foodstuffs are to be produced on an economical and high production basis.

"The handling of the Miller Bill is a true example of what can happen when the constructive efforts of Industry and the Association are combined."

More details on the operations of NAC and what it does for industry were presented by Mr. Hopkins. He pointed out that mention of the names of its committees would give some idea of how well the Association is geared to handle matters of interest to the agricultural formulator. The following 16 committees were listed:

BHC	Membership
DDT	Miller Law Liaison
Finance	Pension Plan
Foreign Trade	Policy
Herbicide	Public Relations
Lawyers	Southern
Legislative	Technical Advisory
Medical	Traffic

In his report, Lea S. Hitchner, executive secretary, discussed the annual report distributed to members. With a look to the future, Mr. Hitchner anticipated that the industry is entering a period of expanding uses in many new fields . . . "However, many of these expanded uses," he said, "require an educational program, pointing out their economic value, as contrasted to the substitution of a new improved pesticide, which simply replaces a product now in use." The potential expansion, he indicated, lies in reduction of losses due to weeds, plant diseases, and insect pests through chemical controls.

USDA and the Food and Drug Administration now have a national program for clean grain, Mr. Hitchner observed, and "clean grain is only possible with the use of chemicals." He noted too that control of both forest insects and disease offer expanding market possibilities, but this category (control of forest pests) will move a little more slowly than some of the other potentials. "Expanded use of materials for soil insects needs only broad promotion . . . Its value is demonstrated and use is already increasing." In connection with the use of fungicides and plant disease materials, Mr. Hitchner reported that this field has never been promoted on an industry basis, in spite of the fact that plant diseases rate as the second highest cause of loss. "Chemical control," he observed "appears to be the only practical answer to the cereal disease problems."

Government's Research Program

"GOVERNMENTAL and industrial research in the field of pesticides are completely complementary," stated Samuel W. Simmons, U. S. Department of Health, Education and Welfare, Atlanta, Ga., in an address on "What Government Research Means to the Pesticide Industry." He observed that "government research supplies new compounds, new formulations, new applications, and helps protect the industry from public criticism. On the other hand," he noted, "research without industry would be sterile. After industry has conquered the manufacturing and logistic problems, then and only then are the ultimate benefits of government research realized."

Reviewing some of the past results of government research, Dr. Simmons reminded that it has aided in creating new products for industry: Examples are allethrin, (Schechter *et al* 1949) and DDVP (Mattson, Spillane, and Pearce, 1955). The latter, he pointed out, is not yet available commercially, but shows considerable potential for use in agriculture; although phenothiazine was synthesized in 1883, it was developed as a pesticide by the Department of Agriculture in 1934. Research on the insecticidal qualities of rotenone resulted in increased use of the compound . . . studies on sesame oil showed that it was an effective synergist in pyrethrum-kerosene sprays. "There are many other examples of the effective collaboration between government and the pesticide industry in placing new and better pesticides in use."

"You will be interested to know," Dr. Simmons told his audience, "that new formulations not yet in the manufacturing stage, show promise for commercial distribution:

"1. DDT-dilan emulsions have been made more effective against resistant houseflies by the addition of cottonseed or soybean oil (DDT: dilan: soybean oil; 200:200:80 mg/sq. ft.). This formulation has been prepared commercially and distributed for fly and roach control to the plants of at least one large nationally operating corporation;

"2. The addition of dimethyl carbonyl to DDT at the rate of 1 to 5 or 10 parts, has been found effective as a space spray against DDT-resistant houseflies;

"3. The addition of sugar markedly increases the residual effectiveness of the organophosphorous compounds, diazinon, malathion, and dipterex, against houseflies. These, or other new formulations, particularly compounds used in agriculture, will soon be produced and distributed."

In view of recent published statements suggesting that DDT or other new pesticides result in a variety of cardiovascular diseases, anemia, insanity, etc., an interesting comment by Dr. Simmons pointed to proven facts concerning the toxicity of these pesticides. He outlined a recent test, stating "We made an epidemiologic study of 83 farm laborers and a survey of 639 unselected persons on a large Mississippi plantation where insecticides were used in large quantities persistently, and in some instances promiscuously, for the control of cotton insects. Except for cases of poisoning due to overt carelessness, no effect of the chemicals on the subjects studied was noted. Comparisons were made of the incidence of disease before and after the introduction of modern pesticides and of disease incidence in areas where insecticides were used intensively with areas where insecticides were little used. No evidence was found that pesticides were the cause of any chronic disease or a contributing factor to diseases of other etiology."

Dr. Simmons cautioned, however, that because safe levels of exposure can be established does not indicate that modern pesticides are harmless. "Proper precautions must be exercised in using the potent materials available. We do not believe," he continued, "that materials should be made available for sale until there is a reasonable assurance that they can be used safely. . . . We see no cause for alarm in the use of the new materials as long as government and industry continue research to give adequate information on the characteristics of these compounds before they are released for sale."

Research In Industry

"INDUSTRIAL research does not normally solve problems entirely through its own efforts," J. T. Thurston, American Cyanamid Co., New York, stated in his report on "Industry Research Looks Ahead" . . . "but works in cooperation with many state and federal agencies. Industry's part in this effort may be classed in the following categories:

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1. Discovery of new compounds.
2. Development of newer improved production methods for compounds of known use.
3. Development of new or known compounds for agricultural uses."

Dr. Thurston detailed some of the work already done in each of the above three categories and outlined some of the problems encountered by industry and how they were solved.

"In view of the many advantages of systemics, particularly the lasting protection they provide and the ease of application, Dr. Thurston remarked that "it is reasonable to suggest that systemics will be the pesticides of tomorrow."

Noting that industrial chemical research has spent considerable time to help the farmer in production of crops and livestock, Dr. Thurston stressed that "much less has been done to protect and preserve agricultural produce subject to decomposition and spoilage from a number of causes after harvest." He cited the new chemicals developed for greater residual insect control in grain, and experiments on the use of antibiotics for the preservation of meat and vegetables.

Dr. Thurston also cited forest pests as targets for future industrial research. "The spruce budworm and the Englemann spruce beetle are particularly serious problems," he said. "As new forest pests appear, it can be expected that research effort will develop compounds for more specific applications to our forest problems."

Dr. Thurston pointed out that with the development of insecticides for seed and soil application . . . systemics . . . plant nutrients, etc. . . . one might let imagination wander to a future system of farming whereby one application of the necessary chemicals would be adequate for the season.

Agr. Chemical Safety Programs

SAFETY in agricultural chemicals manufacturing plants, said A. W. Mohr, California Spray Chemical Co., Richmond, Calif., has thus far shown an excellent record. Management has done a good job of educating its employees in the field of safety . . . and it is evident in the safety record of the plants. "It is the result," he said "of well organized safety programs. Most companies have a department on safety which works at the job constantly." He reported that through safety committees, contests, safety placards and posters, the subject is kept continuously and prominently in the minds of personnel.

Mr. Mohr reminded, however, that "Safety as it relates to the customers of our industry, and especially to those people who actually use or apply our products" presents a different problem. "It is quite a different matter to ship poisons to farmers or other unskilled people, as against shipping carloads of chemicals from one chemical firm to another, where industry employees are well skilled in safety. It is in the consideration of the ultimate user," advised Mr. Mohr, "that a strong and well organized safety program should be developed."

"It is hoped," he said, "that our customers, and especially prospective ones, may be convinced that even though many of our products must of necessity be highly toxic, they are safe to use if handled properly. They should be convinced that pesticides can be used safely if they follow all precautions, and that they can confidently enjoy the tremendous benefits offered by pest control."

"Entomology made easy" might well be the theme of G. Lehker's talk on "What is an Insect?". Professor Lehker, Purdue University, Lafayette, Ind., who is an extension entomologist at Purdue, combines his talents as a cartoonist to lend color and interest to the subject of entomology. NAC members and guests were highly pleased with his comments and sketches in a presentation of his talk before the Association.★★

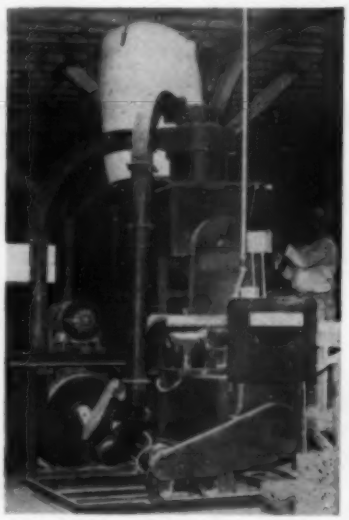
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PESTICIDE TRENDS

(*From Page 46*)

is that everyone who is not in the room at the moment is a cutthroat and a pirate. I sometimes think we would all be a little better off if we would look in the mirror before blasting our competition too ruthlessly.

It certainly is clear that this industry has a basic and vital job to do, and each segment of it must stand or fall on the efficiency with which it does that job. This means good research, honest technical service, sound sales policy, and realistic merchandising and general management policies. There is room for big companies and small ones, national companies and local ones, if they will wisely fit themselves into the picture and perform their functions efficiently without attempting to overreach and infringe upon activities they are not suited to perform. We have suffered, and I believe we still do suffer, from rapid growth of this industry in many respects, but we are growing up.

After all, none of the terms we use in decribing the industry mean very much except, as collective generalties, because the industry, like each of our companies, is made up of individuals. The training and experience of these individuals will in the long run determine the course of our business activities and our degree of success or failure. I think we all know that we have at times suffered from individuals in key positions in the industry who were not properly equipped for their particular responsibilities, no matter how well-trained they might be in other fields. Unfortunately, one of the most important areas of all business activity is the field which is the most ill-defined as to qualifications and training. I refer to the ambiguous designation of "Management." A man may be a good chemist, a good salesman, a good entomologist and even possibly all three, and still be a poor manager. If I were to make one single plea to this industry in the interest of its future healthy growth and development, it would be to concern ourselves most seriously with the management function as applied to our particular industry, whether departmental or company-unit, as I believe this is the segment where sound thinking, constructive policies and good, patient business judgment must be further developed to lead us to a higher plane, and to the greatest individual and collective satisfaction of accomplishment.★★

THE NACA GROWS

(*From Page 47*)

will for the industry, which cannot be measured directly.

It has often been said that an industry is judged by the Association which represents it. This is understandable, particularly in the case of the NAC Association, since leading members of the industry serve as officers of the Association, act as its Board of Directors, and work out problems of common interest on Association committees.

The Association, thus representing the entire industry, is able to do some things which individual companies cannot do for themselves, or, if they can do them, they cannot do them either as well or at such a low cost. One of these things is representing the industry at meetings and on committees.

During the past year, Association staff members or officers attended 29 meetings and conferences with other groups covering such fields as cotton, insect control, clean grain, aerial application of pesticides, and the use of pesticides in beautifying the nation's roadsides.

The Association also took an active part in some 20 committees which are interested in the use of pesticides, and maintained direct liason with more than 40 other associations and groups in the farm and farm chemicals fields.

As is true with any forward looking association, the NAC Association has a very real interest in serving the public as well as Association members. An outstanding example of public service this year was the distribution of the "Clinical Memoranda on Economic Poisons," compiled by the Savannah Laboratories of the U. S. Public Health Service's Communicable Disease Center.

Copies of this report, which contains medical analyses of pesticides and antidotes to use in case of accidental poisoning, were published by the Association as a public service and distributed to doctors all over the United State through the American Medical

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Insect Control by Chemicals

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817 pages, $12.50—This text classifies the insecticides and gives their chemical, physical properties; discusses the hazards to avoid in formulation, mixing and use of compounds; and illustrates modern application equipment.

The Chemistry and Action of Insecticides

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But what lies ahead? We foresee a number of new fields where the uses of the industry's products can be expanded profitably. While continuing all present services to the industry, the Association expects to increase its efforts toward promoting the uses of industry products in these expanding markets during the coming year.★★

SEABROOK FARMS

(*From Page* 32)

quick-freezing operation, it developed new and better practices of insecticide use. The demand from the processing plant required that the vegetables arrive there without insect contamination or undesirable residue. Tests showed a much more careful selection of chemicals was necessary to get the necessary control. The company quickly shifted from the arsenic insecticides to those leaving no undesirable residues, such as rotenone and pyrethrum. Today it is using many of the more recently developed insecticides recommended by the manufacturer and the agricultural institutions, but tested under Seabrook's own conditions before they are used commercially.

Dr. App said the antibiotics are showing promise for disease control on plants and might become major chemicals for agricultural use. They are still, however, largely in the experimental stage. Hormones have been used but they, too, are still in the experimental stage for the particular crops grown. The last large group of chemicals added to the list by Seabrook is the herbicides. These are applied to most crops.

Other officials at Seabrook told *Agricultural Chemicals* about their parts in the complex operation. Lee Towson is the man who deals with the seven field men and the contract farmers. Using tests supervised by Dr. App in the soils laboratory, he makes fertilizer recommendations for all Seabrook owned land. The soils laboratory, under the guidance of Dr. App and Vernon Ichisaka, gives recommendations to the contract farmers, based on soil tests.

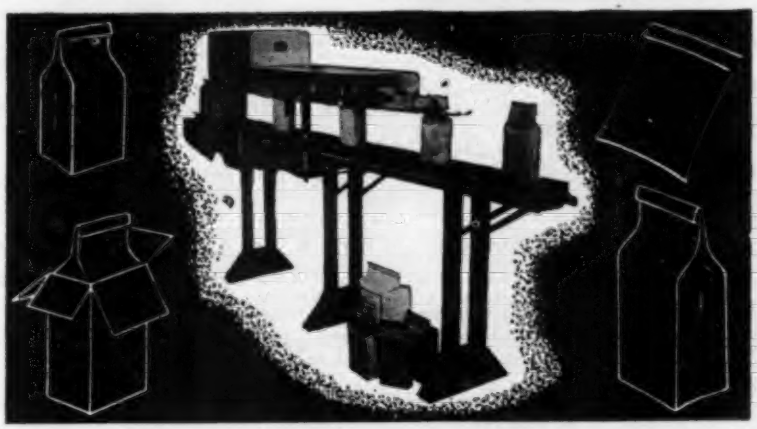
Quality Controls

EDWARD L. Morin, head of the quality control department, told of the problems involved in obtaining vegetables adapted to the freezing operation. He praised insecticides and fungicides for improving yields and making possible better quality. Naturally Seabrook has a big interest in the Miller Amendment, and Mr. Morin thinks food producers will have "no great difficulty with it, provided chemicals are used with the proper knowledge." Tests for pesticide residues which are worked out at the quality control laboratory dictate the application schedule from the standpoint of timing. An insect rearing room and a bio-assay testing room are employed for this work.

Francis A. Raymaley explained that heat units are used only as a tool for planning the crops. They are not accurate enough to determine when to harvest. It is still necesary to examine every field before it is harvested.

Belford L. Seabrook, vice president in charge of production, sketched the background of Seabrook's entrance into the frozen food business in a big way back in 1933 and emphasized the importance of the scientific approach to the once crude practice of farming. Belford's brothers, John M. and C. Courtney, share the responsibility with their father, of seeing that Seabrook's approach to farming and freezing always is a progressive one. The company feels it *has* to be, in such a competitive market.★★

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UREA BIURET

(*From Page 50*)

tures containing 0.5, 1.0, 4.0 and 10% of their nitrogen as biuret was determined after incubation periods of 3, 7, 11, and 15 weeks at 30° C. Ammonium sulfate was used as a standard of comparison. Morgnec sandy loam, a soil known to give consistently good results in nitrification tests, was used in the cultures.

A nitrogen to soil ratio of 400 pounds N per acre was used in all tests. This was obtained by the addition of material or materials containing a total of 20 mgm of N to 100 grams of air-dry soil in a 500 ml. Erlenmeyer flask. The soil previously had been limed to a pH of 7.4 by the addition of 1 gram of $CaCO_3$, equivalent to 10 tons $CaCO_3$ per acre. After thorough mixing of the sample and the soil, water was added to bring the moisture content of the soil up to its moisture equivalent of 17.4%. Cotton plugs were used to partially close the flasks and to reduce evaporation. The weights of the flasks were checked each week and when necessary, water was added to compensate for evaporation. At the end of the incubation periods the soil was extracted by a modification of the method recommended by Harper (4). The nitrate content of the extract then was determined photometrically by the phenoldisulphonic acid method. Nitrifications were conducted in duplicate at the 3-, 7-, and 11-week incubation periods and in quintuplicate for the 15-week period.

The results of the nitrification tests are presented in Table III and Figure I. The data show that the rate of nitrification of biuret is substantially lower than that of either ammonium sulfate or urea. The degree of nitrification of all three materials, however, was substantially the same at the end of 15 weeks. Analyses of variance indicate that no significant difference in degree of nitrification was observed between urea and ammonium sulfate at any incubation period. Similarly, with one exception in which significance was barely attained, the degree of nitrification of the urea-biuret mixtures containing up to 10% of their nitrogen as biuret did not differ significantly at the 1% level from that of urea. In this case, the degree of nitrification of the mixture containing 4% of its nitrogen as biuret exceeded at the end of 15 weeks that of any other source tested and was significantly greater than that of ammonium sulfate, urea or biuret itself.

Summary and Conclusions

THE results of a ryegrass experiment conducted during the winter months showed that biuret injured the crop for a short period after application. After having been in the soil for several weeks, it was found to be a useful source of nitrogen for the crop. Another experiment with corn, cotton, tomatoes and oats during the summer showed that a 100 lb. N per acre application of a 9:1 urea-biuret mixture to the soil did not harm the plants. In laboratory tests at 30°C. the rate of nitrification of biuret was substantially lower than that of either ammonium sulfate or urea but the degree of nitrification of all three materials was substantially the same at the end of 15 weeks. These results tend to substantiate the observations made on the ryegrass experiment.

Acknowledgment

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MALATHION FORMULATIONS

(*From Page* 44)

As with straight malathion dusts, an average of 0.5% actual malathion is recommended for 4 to 5% malathion formulations containing other pesticides or fertilizer materials.

General Discussion

THE results presented herein, while generally favorable with respect to stability and compatibility of malathion, do raise certain technical and developmental problems. Additional work on formulation types discussed, as well as new compositions such as baits, aerosols, granular preparations, and oil solutions, is in progress. Further exploration of the interaction of moisture, pH, metal ions and surface catalysis on the stability of malathion, especially as related to certain filler types, is desirable. Inactivation of catalytic "hot spots" believed present on the surface of certain carriers, by chemical treatment or physical masking, may be possible. Elucidation of the role of these various factors could lead to a solution of some of the incompatibility problems associated with long-term storage of certain malathion wettable powder and dust preparations, as well as development of stable malathion combinations with carbamate type and copper fungicides.

Acknowledgment

THE authors wish to express their appreciation to various members of the Analytical Group of this laboratory for development of necessary analytical procedures and for the many individual analyses performed.

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TABLE IX

Compatibility of Malathion with Some Nutrient and Conditioner Materials

Addend (Pyrax ABB extender used)	% Addend	% 25% malathion w.p.	% Malathion Initial	3 mo.	6 mo.	9 mo.	12 mo.	24 mo.
Potassium Chloride	20	20	5.0	5.0	5.0	—	4.5	4.3
$MgCO_3$	10	20	5.0	4.4	4.1	—	3.6	3.1
Gypsum	80	20	4.7	4.8	4.7	—	5.0	4.7
Rock Phosphate	80	20	4.5	3.3	2.7	—	1.9	—
Super Phosphate 45%	20	20	5.0	5.0	5.0	4.7	—	4.5
Super Phosphate 20%	20	20	5.1	5.0	5.0	—	4.7	4.5
Nutrileaf Fertilizer—Miller Chem.	30	20	5.0	5.0	4.9	4.8	—	4.7
VHPH Fertilizer—Miller Chem.	30	20	5.2	4.8	5.0	4.6	—	4.1
Nu-Green (urea)	20	20	5.0	4.7	4.7	—	4.3	3.8

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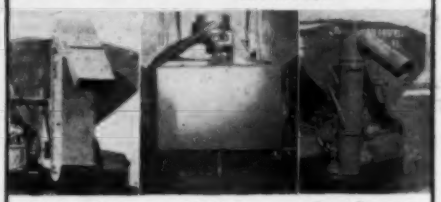
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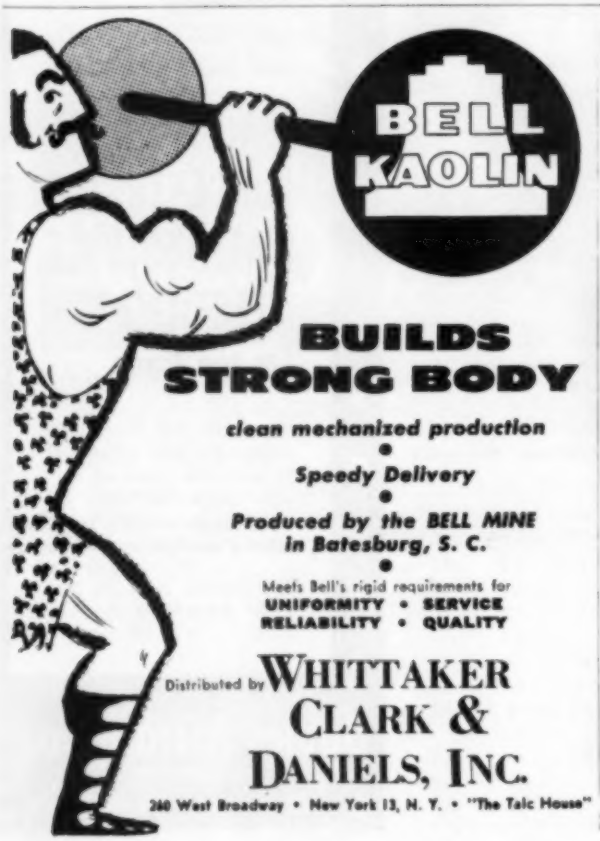
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TABLE VIII

Compatibility of Malathion with Insecticide-Fungicide Combinations

Insecticide-fungicide and Source	% Insec. or fungi., or formulation used	% Malathion 25% w.p.	% Malathion Initial	3 mo.	6 mo.	9 mo.	12 mo.	24 mo.
Captan, tech,—Cal. Spray Chem. Co.	5	20	4.7	4.0	4.5	—	4.7	—
Methoxychlor, 50% w.p.—DuPont	10							4.8 (18 mo.)
Captan, tech.—Cal. Spray Chem.	15	20	4.3	3.7	4.2	—	—	—
Methoxychlor, 50% w.p.—DuPont	20							4.5 (18 mo.
DDT—75% w.p.—DuPont	12							
Fermate—DuPont	15	40	9.8	9.0	8.0	6.8	5.0	—
Wett. Sulfur—Source Unknown	25							
Methoxychlor, 50% w.p.—DuPont	20							
Fermate—Dupont	15	40	9.4	8.1	7.9	6.6	5.6	—
Wett. Sulfur—Source Unknown	20							
Methoxychlor, 50% w.p.—DuPont	25							
Fermate—DuPont	—	4% tech.	4.0	2.9	—	2.4	—	—
Marlate 50—DuPont	—							
Sulfur—DuPont	—							
Marlate 50—DuPont	—	16	3.5	2.5	—	2.6	—	—
Parzate—Dupont								
Marlate 50—Dupont	—	16	3.6	1.7	—	0.5	—	—
Manzate—Dupont	—							
Sulfur—DuPont	—							
Phygon XL—U. S. Rubber Co.	10	60	15.3	14.1	13.9	14.0	14.2	13.5
DDT, 75% w.p.—DuPont	30							
Basic lead arsenate—Unknown	20	40	9.8	8.5	8.4	8.0	8.0	—
Sulfur—Source Unknown	25							
DDT, 75% w.p.—DuPont	15							
Neut. Calcium Arsenate—Penn. Salt Mfg. Co.	45	20	4.8	4.4	4.1	—	3.4	3.0
Sulfur	35							
Corona Dusting Sulfur	40	20	4.7	4.4	4.4	—	4.3	—
Kryolite—Source Unknown	40							

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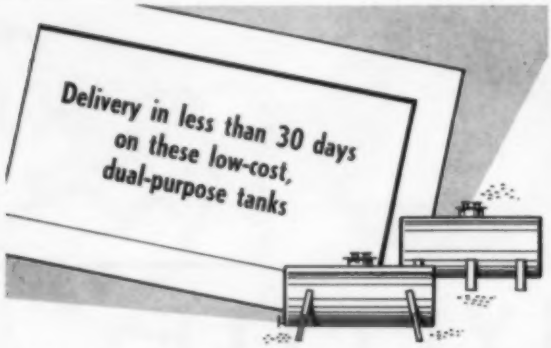
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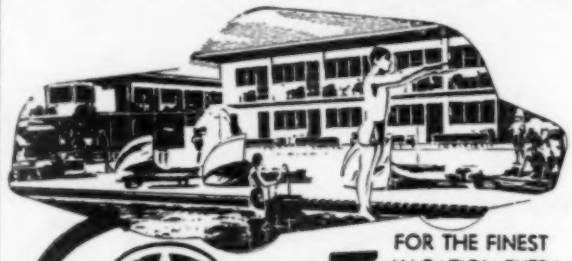
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by

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CONTENTS

The Commercial Agricultural Chemicals
Physical and Chemical Properties
Compatibility
Containers
Fumigants and Fumigation
Toxicology and Residues
Spray Oils and their Properties
Spraying Machines
Rates of Delivery of Spray Machines
Rates of Application for Sprays
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TABLE OF CONTENTS

rats and mice
silverfish
springtails
cockroaches
crickets
earwigs
termites
dry rot fungi
wood-, book-boring and related beetles
psocids
bedbugs and other bugs
clothes moths
household fumigation
hide and carpet beetles
ants
bees and wasps
stored product pests
spider or ptinid beetles
lice
fleas
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Index to ADVERTISERS

Abrasion & Corrosion Engineering Co..... 108
American Agricultural Chemical Co. 4
American Cyanamid Co. 28
American Potash & Chemical Corp. 60
Andrews, W. R. E. Sales, Inc. 93
Antara Chemical Div., General Dyestuff Corp. 21
Armour and Co. 11
Ashcraft-Wilkinson Co. 8
Atlantic Refining Co. ..... Sept.
Atlas Powder Co. 76

Bagpak Div., International Paper Co. ..... Sept.
Baughman Mfg. Co. 106
Bell Clay Co. 106
Bemis Bro. Bag Co. 24
Berkshire Chemicals, Inc. 94
Blue Valley Engr. & Equip. Mfg. Co. 70
Bowser, Inc. ..... Sept.
Bradley & Baker ..... Sept.
Bradley Pulverizer Co. ..... Sept.
Burlap Counsel of the Indian Jute Mills Ass'n. 18

California Spray Chem. Co. 22
Carbide & Carbon Chemicals Co. 17
Chemagro Corp. 15
Chemical Construction Corp. ..... Sept.
Chemical Service Corp. 110
Climax Molybdenum Co. ..... Sept.
Cohutta Talc Co. 110
Commercial Solvents Corp. ..... Sept.
Combustion Engineering, Inc., Raymond Division 82
Continental Can Co., Shellmar Betner Div. 14
Cox, Dr. Alvin J. 109

Davies Nitrate Co., Inc. 105
Davison Chemical Co., Div. of W. R. Grace & Co. 52
Deere & Co., Grand River Chem. Div.....July
Diamond Alkali Co. 6
Doane Agricultural Service, Inc. ..... June
Dorr-Oliver Co. 16
Dow Chemical Co. 102
Duval Sulphur & Potash Co. 8

Eagle-Picher Co. ..... Sept.
Emulsol Corp. ..... Sept.
Exact Weight Scale Co. ..... Sept.

Fairfield Chemical Div., Food Machinery & Chemical Co. 90
Faesy & Besthoff ..... Sept.
Floridin Co. ..... Sept.
Frontier Chemical Co. ..... Sept.
Fluor Corp. 19
Fry Co., Geo. H. 101
Fulton Bag & Cotton Mills ..... Sept.

Geigy Chemical Co. ..... Sept.
General American Transportation Corp. 26
General Reduction Co. ..... Sept.
Glendon Pyrophyllite Co. 107
Grace Chemical Co. ..... Sept.
Grand River Chemical Division of Deere & Co. 27
Greeff & Co., R. W. ..... Sept.

Hammond Bag & Paper Co. ..... Sept.
Hardinge Co. 87
Heckathorn & Co. ..... Sept.
Hercules Powder Co. ..... 4th Cover
Huber, J. M. Corp. ..... Sept.
Hudson Pulp & Paper Corp. 61

International Minerals & Chemical Corp. 10, 25

Jefferson Lake Sulphur Co. 103
Johns-Manville Co. ..... Sept.
Johnson, C. S. & Co. ..... Sept.

Koppers Co. 102
Kraft Bag Co. 23

Lancaster, Allwine & Rommel 110
Lebanon Chemical Corp. 99
Lion Oil Co. 12
Ludlow-Saylor Wire Cloth Co. 74

McLaughlin Gormley King Co. 108
McDermott Bros. Co. ..... Aug.
Michigan Chemical Corp. 86
Minerals & Chemicals Corp. of America.. 3
Mine Safety Appliances Co. ..... Aug.

National Aniline Div., Allied Chem. & Dye Corp. ..... Sept.
Naugatuck Chemical Division, U. S. Rubber Co. ..... Sept.
Edward S. Nelson Ltd. 96
Neville Chemical Co. 71
Niagara Chemical Div., Food Machinery & Chem. Co. ..... Sept.
Ninol Laboratories, Inc. 65
Nitrogen Div., Allied Chem. & Dye Corp. 7
Nopco Chemical Co. ..... Sept.

Oldbury Electro Chemical Co. 106
Olin Mathieson Chemical Corp.....2nd Cover
Omega Machine Co. ..... July

Pacific Coast Borax Co. ..... Sept.
Penick, S. B. & Co. ..... Sept.
Pennsylvania Industrial Chemical Corp.....Sept.
Pennsylvania Salt Manufacturing Co.....Sept.
Phelps Dodge Refining Corp. 95
Phillips Chemical Co. 9
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. ..... Sept.
Potash Company of America .....3rd Cover
Poulsen Co. 89
Prentiss Drug & Chemical Co. ..... Sept.
Private Brands, Inc. ..... Sept.

Raymond Bag Co. ..... Sept.
Raymond Division, Combustion Engineering, Inc. 82
Republic Steel Corp. 104
Renneburg & Sons Co., Edw. ..... Sept.
Reideburg, Theodore Associates 109
Richfield Oil Co. ..... Sept.
Rohm & Haas Co. 48
Royster Guano Co. ..... Sept.

Shell Chemical Co. ..... Sept.
Sohio Chemical Co. 72
Southeastern Clay Co. ..... Sept.
Spencer Chemical Co. ..... Sept.
Spraying Systems Co. 104
Squibb Taylor Inc. 97
St. Regis Paper Co. 80
Stauffer Chemical Co. 75
Sturtevant Mill Corp. ..... Sept.
Summit Mining Corp. ..... Sept.

Tennessee Corp. 78
Texas Gulf Sulphur Co. 88
Thomas Alabama Kaolin Co. ..... Sept.
Townsend, Dr. G. R. 109

Union Bag & Paper Corp. ..... Aug.
Union Special Machine Co. 13
Union Standard Equipment Co. 108
United Chemical Co. ..... Sept.
United Fertilizer Co. ..... Sept.
U. S. Phosphoric Products, Div., Tennessee Corp. 68
U. S. Potash Co. 20
U. S. Steel Corp. ..... Sept.

Vanderbilt Co., R. T. ..... Sept.
Velsicol Corp. 84
Vulcan Stamping & Mfg. Co. ..... Sept.
Vulcan Steel Container Co. ..... Sept.

Williams Patent Crusher & Pulverizer Co. ..... Sept.
Willson Products, Inc. ..... Sept.
Wisconsin Alumni Research Foundation.. 108
Woodward & Dickerson, Inc. ..... Sept.

Young Machinery Co. 98

Zonolite Co. ..... Sept.

Tale Ends

IN response to popular demand the NAC will return to Florida for its 1956 spring session. Headquarters for the convention will be the Hollywood Beach Hotel, Hollywood, and the dates, March 14-18. Convenient to Gulfstream Park, perhaps we can look forward to an Insecticide and Fungicide Handicap.

As predicted in these columns, the Essex and Sussex, scene of the recent fall meeting of NAC, sported a handsomely decorated and much more adequate bar. Some cute new waitresses too. But we missed the gals who have been rushing the scotch out to us for the past ten or more years. Time passes on,—and even the old E & S eventually changes. But not that choice E & S tidbit, long the perennial luncheon favorite of NAC epicures, crispy corn flakes with sliced bananas.

AC

The convention attracted the biggest attendance ever, with about 500 registered, and dozens of others who just looked in and looked out. Foreign visitors who attended included: L. C. Bapistella of Benzenex, Sao Paulo, one of the leading insecticide manufacturers in Brazil, and W. E. O. Walker-Leigh of Cooper, McDougal & Robertson, Berkhamsted, Eng.

AC

With all the new faces, however, some of the old stalwarts were missing. Ernie Hart and his charming wife, Jack and Mrs. Vernon, Byron Webster, all members in good standing of the beach patrol. And Mercer Rowe, Atlanta's contribution toward solving the milk surplus. But the meeting can still be counted as official, for Grub Leonard showed up, complete with white shoes. The nerve of anyone that young being retired. He's not old enough yet to take up golf.

AC

Match cover advertising for agricultural chemicals seems to be getting more and more popular. We are reminded that Geigy Chemical Corp. was last year's winner for the chemical industry in the match book advertising award contest conducted annually by the Match Industry Information Bureau. Nick de Manczuk, advertising manager for Geigy's agricultural chemicals division, just got under the wire, with the Geigy entry being the final one in this year's competition for the "Joshua" plaques, which go to the best among 300,000 match covers in the competition.

AC

An addendum to our note in the August issue regarding the Mader "nitrogen-free" formula fertilizer: Mr. Mader advises us that perhaps the advance story on his new product, released to us by C. E. Arthur of radio station KIOX, Bay City, Tex., was a little premature. Mr. Mader, chief of research of Hale Laboratories, Bay City, indicates that it will be "a number of years, through field elemination before we could conscientiously state that we had something completely different from the general run of fertilizers." Meanwhile, he indicates, "not a gallon of this new formula will or shall be sold until such time, it has been proven to our satisfaction, and the complete satisfaction of all 48 States and their Departments of Agriculture." He concludes with an invitation to "one and all to visit our laboratory, to see our experiments, both in laboratory and field test, I will discuss this formula with all but to devolve the secret formula or chemicals I use in this formula."

AC

Our new front cover was designed by Homer Hill, one of the country's better known commercial artists. A member of the Society of Illustrators, New York, Mr. Hill has won distinction recently in the field of fine art as well as in commercial work.



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